

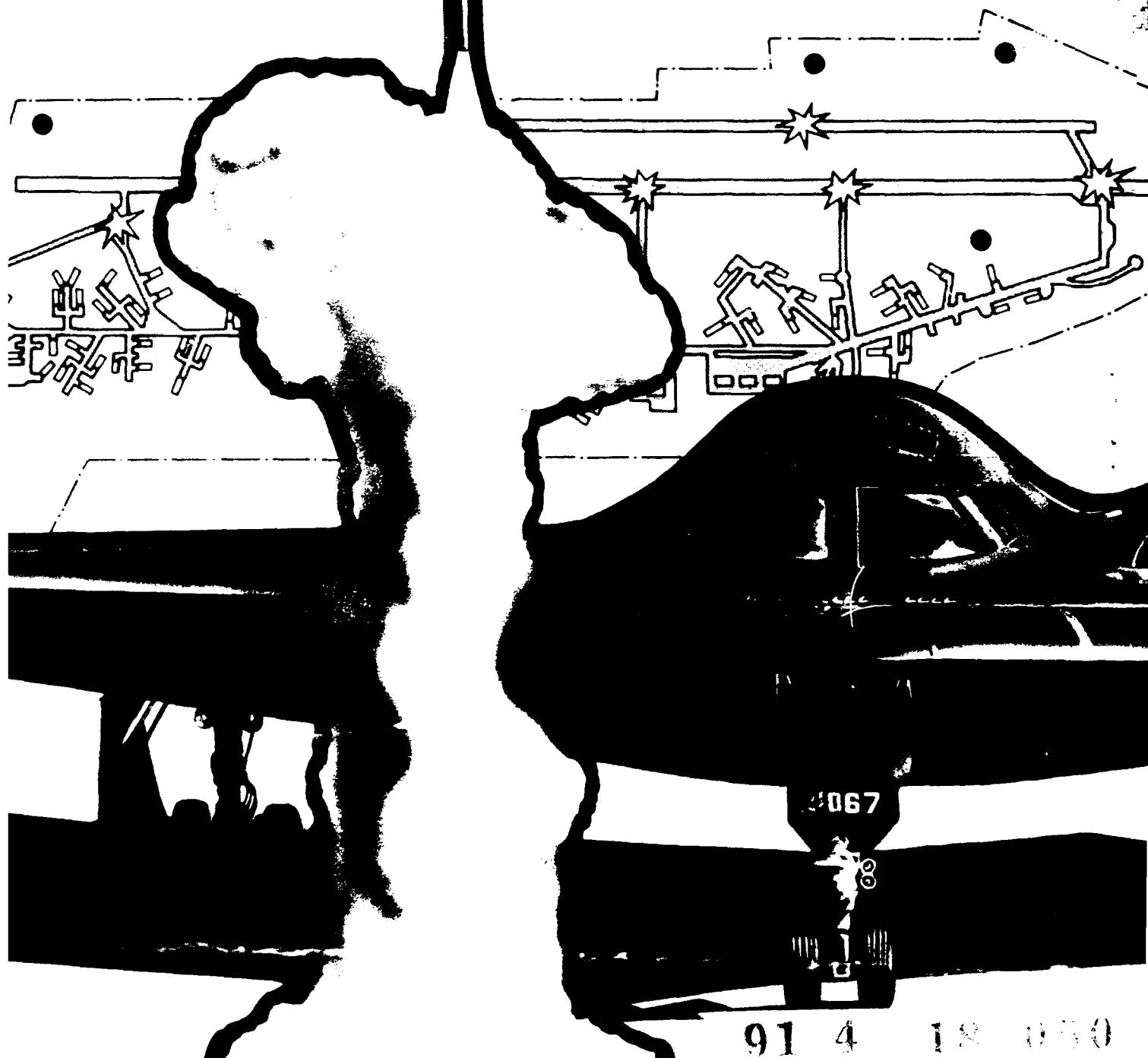
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# Base Attack

## The Promises of Emerging Technology

CHARLES W. NYSTROM, JR., Major, USAF



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## Air Base Attack

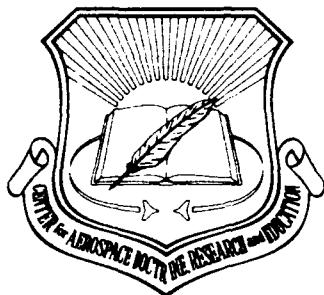
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Research Report No. AU-ARI-90-6

# **AIR BASE ATTACK**

## ***The Promises of Emerging Technology***

*by*

**CHARLES W. NYSTROM, JR., Major, USAF**

**Air University Press  
Maxwell Air Force Base, Alabama 36112-5532**

**April 1991**

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*To my children  
Bonnie and Zoe*

*in the hope that Air Force doctrine and the ability to carry  
it out will always provide a safe and free home*

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## Introduction

*It is more effective to destroy the enemy's aerial power by destroying his nest and eggs on the ground than to hunt his flying birds in the air.*

—Giulio Douhet, 1921

The next decade will bring both the greatest restructuring of the United States military and the greatest uncertainty in international affairs since World War II. During this turbulent period the United States will make procurement decisions that will determine its combat capability as it enters the new millennium. The Air Force's priority mission—control of the air—must not be forgotten when these momentous decisions are made.

The Air Force's past leaders, current doctrine, and predictive studies unanimously advocate an integrated offensive and defensive counterair campaign to achieve air superiority. An effective air base attack (ABA) capability will remain a vital part of counterair campaigns in the twenty-first century's multipolar international environment. The proliferation of chemical, biological, and nuclear weapons increases the probability that the USAF's smaller fighter force will be tasked to quickly eliminate any possibility that an enemy—who may have a larger number of qualitatively similar aircraft—can control and exploit the air.

But the advent of modern main operating bases after the Israeli success in 1967 has denied the Air Force the capability to conduct an effective ABA campaign designed to destroy an enemy's aircraft on the ground. Past efforts to regain this capability—such as Counterair-90's tactical ballistic missiles, and aircraft-delivered munitions, such as the medium-range air-to-surface missile (MRASM) and standoff attack weapon (SAW)—have never reached fruition. Recently the Tactical Air Command, Headquarters USAF, and the Department of Defense with their Competitive Strategies doctrine have once again advocated regaining the Air Force's ability to execute its proven doctrine.

Emerging technology promises the aircraft; the standoff weapons; and the command, control, communications, and intelligence (C<sup>3</sup>I) networks that will continue to make the destruction of the enemy's air force on the ground the most effective method of gaining the control of the air essential to military victory. Because the capabilities of the twenty-first century's Air Force will be decided in the next few years, this emerging technology must be evaluated now. The USAF's *Ability To Fly - To Fight - To Win* will depend on having both proven doctrine and the ability to carry it out.

## Chapter 1

# Control of the Air

*A war is not winnable if the enemy has air superiority. Indeed, no nation enjoying air superiority has ever lost a war by the force of enemy arms. A commander who tries to win—or not lose—without air superiority is trying to do what no one has done before.*

—Col John A. Warden III, *The Air Campaign*

Control of the air is essential to successful military operations. It is now, and always has been, a primary function of the United States Air Force (USAF). Consequently, the basic, operational, and tactical doctrines of the USAF insist that such control be the first priority of aerospace forces. The United States Army (USA) includes control of the air as an integral part of joint operations in AirLand Battle doctrine. The importance of such control is recognized universally; it is as vital to the military strategy of the Soviet Union as it is to that of the United States. The requirement to control the air is an essential element of the theoretical writings of both early and contemporary proponents of air power, and it is validated by military campaigns demonstrating that control of the air can mean the difference between victory and defeat.

### Control of the Air as a Primary Function of the Air Force

Control of the air can be absolute (air supremacy) or limited (air superiority). The ability to obtain and maintain the degree of control required has been a primary function of the Air Force since its inception in 1947. Executive Order 9877, signed by President Harry S. Truman on 26 July 1947, identified several functions of the new service. Among them were gaining and maintaining general air supremacy and establishing local air superiority.<sup>1</sup> Almost a year later, the Key West Agreement, signed by Truman on 21 April 1948, added two more objectives: defeating enemy air forces and controlling vital areas.<sup>2</sup> These four functions remain key Air Force goals even today.<sup>3</sup>

The glossary of terms in the 1948 Key West Agreement includes definitions of *air supremacy* and *air superiority* that form the basis of the definitions found in Joint Chiefs of Staff (JCS) Publication (Pub) 1, *Department of Defense Dictionary of Military and Associated Terms*:

*air supremacy*—That degree of air superiority wherein the opposing air force is incapable of effective interference.

*air superiority*—That degree of dominance in the airbattle of one force over another which permits the conduct of operations by the former and its related land, sea and air forces at a given time and place without prohibitive interference by the opposing force.<sup>4</sup>

In these definitions air superiority differs from air supremacy by the degree to which the air is controlled by friendly forces. That is, air superiority entails control of the air in specific geographic areas for fixed amounts of time. In addition, air superiority acknowledges a level of effective, but less than prohibitive, interference from enemy actions. However, the points at which this interference (in the form of missions not accomplished or attrition suffered) becomes effective or prohibitive are not defined. In the November-December 1976 issue of *Air University Review*, Maj Donald J. Alberts gives a practical definition of air superiority.

The essence of air superiority is like any other measure of superiority. It is the ability to control; it is the ability to exercise one's will in the manner one desires when and where one desires. If the USAF cannot use the air over the battlefield in the manner that air commanders wish in order to affect the tactical and/or strategic goal attainment, then the USAF will not have control of the sky. It will not have air superiority.<sup>5</sup>

## **Doctrinal Priority for Control of the Air**

An examination of the current and future priority for control of the air must begin with Air Force doctrine. As Gen Charles Gabriel, USAF chief of staff, states in the foreword to the current edition of Air Force Manual (AFM) 1-1, *Basic Aerospace Doctrine of the United States Air Force*, "Our basic doctrine describes how we would use aerospace forces to meet the threats and challenges facing us today, but it is also the point of departure for guiding our Nation's aerospace arm in meeting the challenges of tomorrow."<sup>6</sup> Principles for establishing and maintaining control of the air are found in Air Force basic, operational, and tactical doctrines.<sup>7</sup>

Air Force basic doctrine emphasizes that control of the air is the first priority. AFM 1-1 traces the development of this doctrine back to the Army's Field Manual (FM) 100-20, *Command and Employment of Air Power*, issued by the War Department on 21 July 1943.<sup>8</sup> The doctrine of employment in chapter 1 of FM 100-20 states:

THE GAINING OF AIR SUPERIORITY IS THE FIRST REQUIREMENT FOR THE SUCCESS OF ANY MAJOR LAND OPERATION. AIR FORCES MAY BE PROFITABLY EMPLOYED AGAINST ENEMY SEA POWER, LAND POWER AND AIR POWER. HOWEVER, LAND FORCES OPERATING WITHOUT AIR SUPERIORITY MUST TAKE SUCH EXTENSIVE SECURITY MEASURES AGAINST HOSTILE AIR ATTACK THAT THEIR MOBILITY AND THEIR ABILITY TO DEFEAT THE ENEMY LAND FORCES ARE GREATLY REDUCED. THEREFORE, AIR FORCES MUST BE EMPLOYED PRIMARILY AGAINST THE ENEMY'S AIR FORCES UNTIL AIR SUPERIORITY IS OBTAINED. IN THIS WAY ONLY CAN DESTRUCTIVE AND DEMORALIZING AIR ATTACKS AGAINST

LAND FORCES BE MINIMIZED AND THE INHERENT MOBILITY OF MODERN LAND AND AIR FORCES BE EXPLOITED TO THE FULLEST [capitalization in original].<sup>9</sup>

FM 100-20 identifies three types of missions as the means to execute this doctrine: gaining the necessary degree of air superiority (counterair), preventing movement of hostile troops and supplies (interdiction), and participating with the Army to gain objectives on the immediate front of the ground forces (close air support).<sup>10</sup> Of these missions, FM 100-20 selects as the first priority the ability "to obtain and maintain air superiority in the theater."<sup>11</sup>

The primacy of control of the air and the tasking to achieve it are retained, 41 years later, in the basic doctrine of the 1984 edition of AFM 1-1.

The basic objective of aerospace forces is to win the aerospace battle—to gain and/or maintain control of the aerospace environment and to take decisive actions immediately and directly against an enemy's warfighting capacity. These actions include neutralizing or destroying the enemy's forces, his command and control mechanisms, and his sustaining warfighting capacity.<sup>12</sup>

A draft revision of AFM 1-1 continues to identify aerospace control as "the first priority of aerospace forces,"<sup>13</sup> because it "permits aerospace and surface forces to operate more effectively and denies these advantages to the enemy."<sup>14</sup> Similarly, the operational doctrine in a draft revision of AFM 2-XC, "Tactical Air Operations," states that "a favorable air situation is a prerequisite for the successful conduct of other combat operations."<sup>15</sup> Essentially the same attitude toward control of the air is found in the combined doctrine of Allied Tactical Publication (ATP) 33(B), *NATO Tactical Air Doctrine*.<sup>16</sup>

Although these excerpts emphasize the importance of control of the air, Air Force doctrine concedes that absolute control—air supremacy—may not be possible and that even maintaining air superiority requires a persistent counterair campaign.<sup>17</sup> These limitations on control of the air were recognized early and documented in FM 100-20.

Complete control of the air can be gained and maintained only by total destruction of the enemy's aviation. Since this is seldom practicable, counter air force operations in the theatre must be carried out continuously and intensively to gain and maintain air supremacy and to provide security from hostile air operations.<sup>18</sup>

Consequently, theater commanders must continually determine the degree of limited control—air superiority—necessary for successful military operations and make operational decisions as to the type of missions and level of effort required. Air Standardization Agreement 45/4B, *Tactical Air Procedures: Counter Air Operations*, addresses this matter.

There may be times when resources are not adequate to gain and ensure continuous air supremacy. Then the goal . . . must be to achieve air superiority at critical times and specific places to facilitate the success of other surface operations. Decisions will be based, therefore, on an assessment of the degree of air superiority needed to support the surface and/or air battle.<sup>19</sup>

Throughout Air Force doctrine air superiority is the theater commander's first priority. It deserves this primacy not because it is an end in itself but

because it is the enabling condition that gives freedom of action to all friendly air, land, and naval forces and denies the same to the enemy. AFM 1-1 provides three examples of the freedom of action provided by controlling the air: freedom of action for aerospace forces to successfully conduct their assigned missions, tactical flexibility for surface forces allowing them "to carry out their own plan of action without interference from an enemy's aerospace forces," and freedom to conduct effective strategic attacks against targets in an enemy's heartland.<sup>20</sup>

The ability of the USAF to accomplish its many missions and tasks depends first on controlling the air. This includes our ability to freely conduct sustained counterair, air interdiction, close air support, special operations, airlift, surveillance and reconnaissance, and maritime operations missions, as well as the specialized tasks of aerial refueling, electronic combat, and rescue and recovery.<sup>21</sup> The need for the ability to conduct these missions and tasks when and where required by the theater commander's operational plan underscores the need for air superiority over both friendly and enemy territories. Strategic aerospace offensive missions against key military, economic, and political targets deep in the enemy's homeland "can produce benefits beyond the proportion of effort expended and costs involved" in destroying the enemy's ability and will to wage war, but they must be free of the threat of unacceptable attrition.<sup>22</sup> History is clear, those who can freely exploit the air over an enemy's homeland will be victorious.

Freedom of action for both air and surface forces is prominent in the description of joint operations as a part of AirLand Battle doctrine, which is found in Army FM 100-5, *Operations*: "the Army's approach to generating and applying combat power at the operational and tactical levels."<sup>23</sup> The Army applies AirLand Battle doctrine to all levels of conflict from low intensity to theater nuclear warfare.<sup>24</sup> It emphasizes retaining the initiative in coordinated rear, close, and deep operations. Control of the air is considered essential in protecting rear staging areas, in executing both offensive and defensive operations in close contact with the enemy, and in persistently attacking the enemy throughout the depth of the battlefield.<sup>25</sup> FM 100-5 emphasizes the importance of tactical air's freedom of action to conduct deep operations—tactical air must have the freedom (air superiority) to attack enemy forces, prohibit delivery of sustaining supplies, and strike combat reserves when they are concentrated in rear areas and are most vulnerable.<sup>26</sup>

While the urgency of enemy actions may require direct attacks against forces in contact, air forces are normally more efficiently used to attack in depth those targets whose destruction, disruption, or delay will deny the enemy the time and space to employ forces effectively.<sup>27</sup>

The North Atlantic Treaty Organization (NATO) also sees the need for air superiority, as shown in the following 1987 description of NATO's Northern Army Group's concept of operations.

Air superiority must protect rear area prepositioned supplies and reinforcements, and give the time to move necessary forces into place. Air superiority must also insure that FOFA [follow-on forces attack] missions keep the enemy second echelon forces off of Northern Army Group's forces until the first battle is won and friendly forces are reconstituted.<sup>28</sup>

Finally, Air Force leaders have emphasized that control of the air is the primary mission of the Air Force. In May 1984 Tidal W. McCoy, assistant secretary of the Air Force, stated:

Air superiority is the first mission, because we believe that without control of the air, neither we nor the ground forces can succeed. In effect, we must now perform counterair, air superiority, deep interdiction, and battlefield interdiction at the same time.<sup>29</sup>

Similarly, Secretary of the Air Force Donald B. Rice is quoted in the February 1990 issue of *Air Force Magazine*: "US forces in modern times always have enjoyed control of the skies over the battlefield . . . 'we don't want to contemplate' fighting under other conditions."<sup>30</sup>

Control of the air is also a primary objective of one of the United States' potential adversaries, the Soviet Union. Lt Col Lynn M. Hansen, in the fall 1978 issue of *Strategic Review*, summarizes the Soviets' belief. "The achievement of air supremacy (*gospodstvo v vozdukhe*) is the most important precondition for victory over the enemy on the ground, in the air and at sea."<sup>31</sup> The Soviets' recognition of the importance of control of the air can be traced, as in the United States, to the beginning of their aviation history. Hansen reports that "as early as 1940, it was claimed that in the absence of air supremacy preparing a frontal offensive is impossible."<sup>32</sup> Obtaining control of the air at the very initiation of hostilities is vital to the Soviets because of their strategy of deep operations. In 1927 V. K. Triandafillov first outlined this strategy in *The Basic Character of Operations of Modern Armies*, and it is retained today. Christopher Donnelly, the head of the Soviet Studies Research Centre of the British Ministry of Defence at the Royal Military Academy, Sandhurst, describes Triandafillov's deep operations in the May-June 1984 edition of *NATO's Sixteen Nations*.

In this concept, the enemy would be defeated quickly, without a long debilitating campaign, by means of rapid armored thrusts and coordinated air strikes penetrating deep into his territory to outflank and undermine his defenses, paralyze his war economy, and destroy the administrative fabric of his society.<sup>33</sup>

Immediate control of the air and deep operations are just as important to the Soviets today because they believe "a modern war against a powerful and sophisticated enemy possessing nuclear weapons must be won quickly if it is to be won at all."<sup>34</sup> Donnelly describes a typical Soviet campaign as opening with massive attacks against "nuclear weapons delivery systems; command, control, communications elements; reserves and reinforcements; and the supply chain."<sup>35</sup> He estimates that they would obligate 50-70 percent of available air assets to achieve air superiority over the axes of committal of operational maneuver groups.<sup>36</sup> The expectation that the "Pact expects to conduct theater-wide air operations to destroy NATO's

nuclear forces and gain air superiority" is verified by their force structure.<sup>37</sup> Since 1970 Soviet tactical aviation has been transformed from a force concentrated on air defense and close air support into an effective offensive counterair force including the third-generation Su-19 Fencer and MiG-27 Flogger, fourth-generation MiG-29 Fulcrum and Su-27 Flanker, and fifth-generation counterair fighter and air superiority fighter now being developed. As Air Vice-Marshal (AVM) M. J. Armitage, then deputy commander of Headquarters Royal Air Force, Germany, stated in 1979:

The result is an entirely new level of Warsaw Pact air threat, in quantity but particularly in quality, [which] demands a powerful offensive [NATO] counter-air arm that can take out the high value enemy air operating bases, and do so in spite of the comprehensive systems that will be deployed in their defense.<sup>38</sup>

## **Historical Foundation of Current Doctrine**

The US Air Force's doctrine of control of the air is rooted in the theoretical writings of both early and modern proponents of air power and validated by the military campaigns since World War II. One of the earliest spokesmen for air power was the Italian theorist Giulio Douhet. In 1921 he argued forcefully for "command of the air." Douhet believed that being "in a position to prevent the enemy from flying while retaining the ability to fly oneself" would decide a conflict because it enables the protection of one's own territories, bases, lines of communication, and army and navy while exposing those of the enemy to air attack.<sup>39</sup> As importantly, control of the air allows a counterair campaign to prevent the reconstitution of the enemy's air force by denying the enemy access to vital supplies and manufacturing facilities.<sup>40</sup> Douhet's predictions on the strategic consequence of losing command of the air were proven 24 years later in the unconditional surrender of Germany and Japan after they lost control of the skies in World War II. Colonel Warden summarizes the results of military campaigns since then in *The Air Campaign*.

Air superiority is a necessity. Since the German attack on Poland in 1939, no country has won a war in the face of enemy air superiority, no major offensive has succeeded against an opponent who controlled the air, and no defense has sustained itself against an enemy who had air superiority. Conversely, no state has lost a war while it maintained air superiority, and attainment of air superiority consistently has been a prelude to military victory.<sup>41</sup>

Numerous examples support Colonel Warden's analysis of the necessity of air superiority to both offensive and defensive operations.

### **World War II**

Germany's successful campaigns in the European theater at the beginning of World War II—Poland, Norway, Holland, France, Greece, Crete, and the Soviet Union (1941)—benefited from air supremacy.<sup>42</sup> The early German blitzkrieg offensives succeeded, in part, because Luftwaffe control of

the air enabled effective interdiction and close-air-support missions.<sup>43</sup> Because the Luftwaffe completely deprived the Soviets of air cover during Operation Barbarossa in June 1941, the German offensive was successful even though "General Heinz Guderian (The Panzer Leader) estimated that Russian tank strength out-numbered German by about 3 to 1, and claimed their T-34 tank to be superior to the German Panzer MK IV."<sup>44</sup> As Warden emphasizes, this was both the last time Germany enjoyed air superiority and its last successful offensive.<sup>45</sup>

In July 1943 the Soviet Union gained momentum at the Kursk salient during the largest tank battle ever fought, Operation Zitadelle, when "a shortage of fighters against the growing Soviet counteroffensive finally led to a shift of air superiority in favour of the Russians."<sup>46</sup> During the subsequent offensive in June 1944, the Soviets enjoyed near-total air superiority as they fielded 7,000 aircraft against 40 Luftwaffe fighters.<sup>47</sup> The Reich's last attempt at blitzkrieg ended in defeat. After seeming to recognize the importance of control of the air in all of his previous successful offensives, even to the point of canceling his planned invasion of the United Kingdom when he realized that air superiority could not be obtained, Adolf Hitler pressed ahead with this last offensive without air superiority. Thus he invited disaster.

Air superiority was also vital in the Mediterranean theater both in securing supply routes to North Africa and over the battlefield. In the late fall of 1941, neither side obtained air superiority in the battle area. Field Marshal Erwin Rommel drove the British back to the Egyptian border. The British, however, achieved air superiority over the Mediterranean from a base of operations at Malta and then cut the supplies to Rommel's armored force in Libya and Tunisia. Eventually they reduced Rommel's force to 40 tanks and compelled him to retreat from Tobruk and the Egyptian frontier. The situation changed when German air attacks on Malta deprived the British of air superiority over the Mediterranean. In April of 1942 Rommel launched an offensive.<sup>48</sup> It was short-lived, however, because the Allies achieved control of the air over the battlefield through counterair and interdiction missions. Rommel complained, "British air superiority threw to the winds, all our operations and tactical rules."<sup>49</sup> Rommel's frustration from fighting without air superiority is seen in his remarks after his last offensive at Alam Halfa. "'Anyone who has to fight, even with the most modern weapons, against an enemy in complete control of the air, fights like a savage against a modern European army.'"<sup>50</sup>

Allied control of the air and success in North Africa can be credited to the British Royal Air Force (RAF) leaders who asserted the primacy of air superiority. RAF AVM Arthur Coningham convinced the Americans that air superiority was essential to successfully accomplish close-air-support and interdiction missions.<sup>51</sup> Gen William W. Momyer, a participant in the campaign, describes the development of air superiority doctrine in North Africa.

The missions and practically the whole orientation of the XII Air Support Command were really to support the Army's II Corps. I think that accounts for the fact that we weren't going out hitting those airfields, and there was very little understanding of the importance of air superiority. . . . So, with the establishment of that Allied tactical air force (Northwest African Tactical Air Force), Air Vice Marshal Coningham came down to my airfield—at the time I was a colonel—and he said, "Colonel, the first thing we are going to do is get out and destroy the German air force. When we have destroyed the German air force in North Africa, we will do all the air support and anything else that the Army wants. But until we get those airfields and get those German airplanes off our back, we are not going to do anything else."<sup>52</sup>

Brig Gen Laurence S. Kuter, the deputy commander of the Northwest African Tactical Air Force, brought these lessons on air superiority back to the United States from North Africa and codified them in the Army Air Forces' declaration of independence and first doctrinal publication FM 100-20. General Kuter stated in May 1943,

Any modern successful battle consists of a battle in the air which must be won before the surface battle is begun. If the air battle has been won the surface forces are freed from effective hostile air attack and the offensive power of the free air force can be applied directly in support of the surface forces.<sup>53</sup>

The Allies continued the pressure against the Axis forces with the invasion of Sicily and Italy. Again the Germans had to fight without air superiority and faced the same difficulties as in North Africa. As Rommel noted: "Strength on the ground was not unfavorable to us. . . . It's simply that their superiority in the air and in ammunition is overwhelming, the same as it was in Africa."<sup>54</sup>

Gen Frido von Senger und Etterlin, commander of the XIV Panzer Corps, said that enemy air control made lateral movement difficult and compelled him to move only at night.<sup>55</sup> He noted that the commander who could only move during darkness was like a chess player allowed only one move for each three made by his opponent.<sup>56</sup> In March 1944 control of the air also permitted the Allies to impose Operation Strangle, an interdiction campaign against roads and railroads in Italy. At least partially as a result, in May 1944 the Allies broke through the Gustav line and forced the Germans to retreat while the Allies controlled the air. Air action killed or wounded 70,000 German soldiers.<sup>57</sup>

In June 1944 Allied control of the air enabled a successful cross-channel invasion which had been denied Hitler because he lacked air superiority. Allied commanders debated the best use of air power in preparation for the invasion. The issue was settled in March 1944 with the following directive from Gen Dwight D. Eisenhower.

The first prerequisite of success in the maintenance of the combined bomber offensive and of our re-entry on the Continent is an overall reduction of the enemy's air combat strength and particularly his air fighter strength. The primary role of our air forces in the European and Mediterranean theaters is, therefore, to secure and maintain air superiority.<sup>58</sup>

As a result the Allies conducted a preliminary two-month interdiction campaign in the invasion area and enjoyed complete air supremacy over the beaches during the invasion.

Germany had two options for defending against the anticipated invasion—put all its forces on the beaches or hold some forces in reserve until the landing beach was known. "Rommel, who had experience trying to move forces when the enemy controlled the air, argued strongly for the first option. [Karl Rudolph Gerd] von Rundstedt, who had no significant experience with enemy air, argued just as strongly for the second. Von Rundstedt won."<sup>59</sup>

After the invasion the German commanders were unanimous on the difficulties Allied air supremacy presented to movement on the battlefield. Von Rundstedt admitted, "The Allied Air Force paralyzed all movement by day, and made it very difficult even at night."<sup>60</sup> His successor, Gen Gunther von Kluge, similarly stated, "The enemy's command of the air restricts all movement in terms of both space and time, and renders calculation of time impossible."<sup>61</sup> Rommel remarked on the experience that was by now all too familiar to him. "Our operations in Normandy are tremendously hampered, and in some places even rendered impossible,' and 'the movement of our troops on the battlefield is almost completely paralysed."<sup>62</sup>

The *United States Strategic Bombing Surveys Summary Report* on the European War's conclusion capsulizes the result of Eisenhower's air campaign—Allied air "superiority made possible the success of the invasion."<sup>63</sup> The report concludes that the Allied powers' full domination of the air over the enemy's armed forces and sustaining economy was essential to victory because it enabled sustained attacks which eventually caused the decline and collapse of the German economy. It also cites the ineffectiveness of such protective measures as camouflage, smoke screens, dispersal, and underground factories. The Allied victory confirmed Douhet's vision of the power of command of the air. "The German experience suggests that even a first class military power—rugged and resilient as Germany was—cannot live long under full-scale and free exploitation of air weapons over the heart of its territory."<sup>64</sup>

In the Pacific theater, Gen Douglas MacArthur fought both with and without air superiority. He suffered without it during the Japanese invasion of the Philippines and later felt the effect of the delayed completion of Henderson Field on Guadalcanal. MacArthur also saw what happened to the Japanese when they tried three offensive operations without having land-based air superiority in New Guinea: disruption of a convoy to Port Moresby, a defeated overland offensive across the Owen Stanley mountain range, and an unsuccessful landing at Milne Bay.<sup>65</sup> Air superiority became the primary goal of MacArthur's operations.<sup>66</sup> In his campaign to recapture the Philippines, "he captured only those areas necessary to support air operations against Japanese airfields, and then used the captured airfields to extend air superiority out as far as possible."<sup>67</sup>

The *Strategic Bombing Surveys Summary Report* cites air supremacy as the decisive factor in the Pacific theater. "It seems clear that, even without the atomic bombing attacks, air supremacy over Japan could have exerted sufficient pressure to bring about unconditional surrender and obviate the need for invasion."<sup>68</sup>

After the war, Allied leaders remarked on the role of control of the air. Field Marshal Bernard L. Montgomery observed:

When I myself rose to high command in 1942, I laid it down as an axiom that you must win the air battle. . . . But as the war progressed and my experience grew, I decided that was not quite right: it was necessary to gain, as far as possible, 'mastery in the air' over the area of operations—and that principle saw me through to the end of the war.<sup>69</sup>

Marshal of RAF Lord Arthur William Tedder said simply, "Air superiority is the prerequisite to all war-winning operations, whether at sea, on land, or in the air."<sup>70</sup> Similarly, Gen Omar Bradley stated, "In spite of the fact that air power can never be decisive in total war, the air battle must be won if a war is to be won."<sup>71</sup> Sir Winston Churchill said that "for good or ill, air mastery today is the supreme expression of military power. And fleets and armies, however necessary and important, must accept subordinate rank."<sup>72</sup> The testimony of these leaders and the results of WWII campaigns are clear—control of the air is essential. Achieving and maintaining this control enabled successful offensive and defensive operations; loss of control led to the defeat of Germany and Japan.

The requirement to control the air remained a part of the doctrine of the United States Air Force between World War II and the Korean War. Tactical Air Command (TAC) was created after the war. Gen Robert M. Lee (TAC's first chief of staff), Maj Gen Elwood ("Pete") Quesada (the first TAC commander), and General Momoyer (then the TAC assistant chief of staff) developed "a comprehensive tactical air doctrine based on the experiences in World War II" for the command.<sup>73</sup>

All three of the leaders participated in a 1982 panel discussion on air superiority, along with Gen James Ferguson, who taught air doctrine at the Air Command and Staff School at Maxwell Field, Alabama, from 1946 to 1950.<sup>74</sup> They concurred that even though the Air Force emphasized strategic nuclear warfare and Air Force procurement reflected this emphasis, air superiority "doctrine was alive and vigorous" within TAC.<sup>75</sup> General Lee recalled, "Although we didn't have much capability to exercise our tactical doctrine, we still maintained the philosophy of a requirement for control of the air in order to get proper tactical air operations."<sup>76</sup>

### **Korean War**

In every conflict since World War II, the United States achieved and maintained air superiority. This allowed our ground forces to avoid enemy air attack. General Momoyer, commander of two units in Korea—the 8th Fighter-Bomber Wing and the 314th Air Division—gives this description of Korean air superiority.

In the Korean War there wasn't a single attack that I have been able to identify that was put against our ground forces. So air superiority has remained almost a philosophical thing. The Army has never had to operate in an environment where it had to consider: "Do we dare make this move at 12 o'clock noon because that road is under the surveillance of enemy aircraft, or can we move that division from here to here during this period of time that we think is essential?" . . . They have never had to fight without air superiority.<sup>77</sup>

During the Korean War air superiority was especially critical during the retreat of the American forces from the Yalu River in 1950. The Chinese commander Lin Piao tried to chase the Americans during the day but suffered 30,000 casualties. The Americans' control of the air forced Lin Piao to move only at night and thus allowed General MacArthur to successfully retreat with only 13,000 casualties.<sup>78</sup> Then during the subsequent defense of the Pusan perimeter, air superiority again enabled MacArthur to conduct an extensive air interdiction campaign and hold the perimeter.<sup>79</sup>

The United States' ability to achieve air superiority in the Korean War also made possible air interdiction missions against North Korean targets. Lt Gen Nam Il, the chief representative of North Korea at the armistice talks, stated the effect of these missions.

It is owing to your strategic air effort of indiscriminate bombing of our area, rather than to your tactical air effort of direct support to the front lines, that your ground forces are able to maintain barely and temporarily their present position.<sup>80</sup>

Air superiority in Korea reinforced the lessons of World War II. It protected friendly forces from hostile air attack and enabled interdiction and close-air-support missions which supported ground forces both on the offensive and during withdrawal. Finally, as in Germany and Japan, the North Koreans' loss of control of their own airspace brought the conflict to an end.

### **Vietnam Conflict**

In the Vietnam conflict, the United States enjoyed absolute air supremacy over South Vietnam, Laos, Cambodia, and Thailand and maintained air superiority over North Vietnam. General Momoyer, simultaneously the commander of Seventh Air Force and Gen William C. Westmoreland's deputy commander for operations during the war, gives this description of air superiority in Vietnam.

Our Army and Navy enjoyed complete immunity from attacks by the North Vietnamese Air Force. Our deployments of troops, locations of supply points, and concentrations of ships in ports were never restrained because of a threat from the North Vietnamese Air Force.<sup>81</sup>

As a result of our ability to achieve control of the air and to provide interdiction and close air support when and wherever required, "the North Vietnamese were unable to conduct a successful conventional offensive as long as American air power was stationed in Indochina."<sup>82</sup> Finally, in December 1972, aerial attacks on the North Vietnamese capital, Hanoi, during Linebacker II brought a negotiated settlement to the conflict.<sup>83</sup>

## **Middle East Conflicts**

Air superiority has played a vital role in each Middle East conflict since the British and French achieved control of the air over Arab forces in 1956.<sup>84</sup> In the 1967 war, the Israeli Air Force (IAF) eliminated both the Egyptian and Syrian air forces in one day on 5 June. Even though Israel commanded the smaller and less well-equipped force, control of the air won a quick victory.<sup>85</sup>

In the October 1973 war, Egyptian control of the air over the battlefield, achieved through ground-based defenses and fighter aircraft, brought initial success. This initial success became defeat when they failed "to establish air superiority beyond the tactical area even at a time when the Israeli Air Force was vulnerable, suffering high attrition, with its resources grossly overstretched."<sup>86</sup> This Egyptian failure allowed the Israeli Air Force to suppress Egyptian ground defenses, regain air superiority over the battle area, and achieve victory. Gen Robert Dixon, commander of Tactical Air Command, in the spring 1974 issue of *Strategic Review* emphasizes that Israeli achievement of air superiority provided a clear lesson: "ground forces that do not enjoy protection from an attack and are without benefit of substantial air support will not prevail over a force possessing these essentials."<sup>87</sup>

In June of 1982 the Israeli Air Force once again brought victory in Bekaa by achieving air superiority: the IAF destroyed 24 surface-to-air missile batteries and 86 Syrian fighter aircraft.<sup>88</sup> This allowed the Israeli ground forces to advance safely and quickly toward Beirut. "One only has to see the photographs of Israeli armour jam-packed on the road to Beirut to understand the impact of Israeli air superiority: what havoc enemy air power could have caused to these columns if Israel had not commanded the air."<sup>89</sup>

## **Other Conflicts**

Control of the air has played an important role in military conflicts around the world. In 1971 India achieved air superiority in conflicts with Bangladesh and Pakistan. This enabled Indian airborne operations in Bangladesh and the decimation of a Pakistani armor thrust at Longewala.<sup>90</sup> In the Falkland Islands conflict between Great Britain and Argentina, control of the air was vital to sea control, just as in the Battle of the Atlantic in World War II. In fact, the war might have had a different outcome "if Argentina had been able to deploy even one squadron of fighter aircraft on the Falklands before the British Task Force reached the South Atlantic."<sup>91</sup> Indeed, this is exactly what the United Kingdom did after the war.<sup>92</sup>

Libya, Grenada, and Panama are three examples of recent successful United States military operations conducted with control of the air. They are the most recent illustrations of USAF Chief of Staff Gen John D. Ryan's prediction in 1972 that "considering the nature of modern war . . . the Air Force must be able to deny control of the air to enemy air forces and to

provide ground and naval forces the assistance necessary for them to control their environment.<sup>93</sup> During these operations, as in every instance during and since World War II, the common denominator of success has been establishing and maintaining control of the air. This must be the first priority of the theater air commander because as Gen Charles L. Donnelly, Jr., commander in chief of US Air Forces in Europe from 1984 to 1987, emphasizes, "The air campaign cannot succeed until air superiority is achieved."<sup>94</sup> Once accomplished, friendly air, land, and naval forces are protected from enemy attack and have the freedom to accomplish their assigned missions and achieve victory. At the same time, the enemy is open to air attack, is hindered in achieving objectives, and faces defeat.

Because air superiority will be just as essential to victory on tomorrow's battlefield as it was in every past conflict, control of the air remains the first priority of the Air Force. This control must be achieved and maintained through a theater counterair campaign. The following chapter discusses the importance of air base attacks aimed to destroy the aircraft critical to the enemy's control and exploitation of the air where they are the most concentrated and vulnerable—on the ground.

#### Notes

1. Richard I. Wolf, *The United States Air Force Basic Documents on Roles and Missions* (Washington, D.C.: Office of Air Force History, 1987), 90.
2. *Ibid.*, 163.
3. Joint Chiefs of Staff (JCS) Pub 2, *Unified Action Armed Forces*, December 1986, 2-11.

The following are primary functions of the Air Force (2-15):

To organize, train, equip, and provide forces for the conduct of prompt and sustained combat operations in the air—specifically, forces to defend the United States against air attack in accordance with doctrines established by the Joint Chiefs of Staff, gain and maintain general air supremacy, defeat enemy air forces, conduct space operations, control vital air areas, and establish local air superiority except as otherwise assigned herein.

4. JCS Pub 1, *Department of Defense Dictionary of Military and Associated Terms*, 1 June 1987, 21-22. Superseded by JCS Pub 1-02.
5. Maj Donald J. Alberts, USAF, "A Call from the Wilderness," *Air University Review* 38, no. 1 (November-December 1976): 41.
6. AFM 1-1, *Basic Aerospace Doctrine of the United States Air Force*, 16 March 1984, iii.
7. AFR 1-2, *Assignment of Responsibilities for Development of Aerospace Doctrine*, 25 July 1984, 1.
8. AFM 1-1, A-2.
9. War Department Field Manual (FM) 100-20, *Field Service Regulations, Command and Employment of Air Power*, 21 July 1943, 1.
10. *Ibid.*, 10-11.
11. *Ibid.*
12. AFM 1-1, 1-3.
13. AFM 1-1, "Basic Aerospace Doctrine of the United States Air Force," draft, January 1990, 3-2.
14. *Ibid.*

15. AFM 2-XC, "Aerospace Operational Doctrine, Tactical Air Operations," ser. enth draft, 15 April 1988, 5-1. This draft was written by and obtained from the doctrine division of Tactical Air Command (TAC). When adopted, AFM 2-XC will replace AFM 2-1, *Tactical Air Operations—Counter Air, Close Air Support, and Air Interdiction*, 2 May 1969. Portions may also be used in revising TACM 2-1, *Tactical Air Operations*, 15 April 1978.

16. Allied Tactical Publication (ATP) 33(B), *NATO Tactical Air Doctrine*, November 1986, 2-4, 4-1:

para. 205. A basic consideration on employing air forces is gaining and maintaining the freedom of action to conduct operations against the enemy. Air superiority permits effective use of the air environment by friendly forces, while denying it to the enemy.

para. 403. The required degree of control of the air will depend on the tactical situation; however, NATO air forces must be capable of achieving such control whenever and wherever it is required, and regardless of weather and light conditions . . . because both surface and air operations are significantly impaired by effective enemy air opposition, the outcome of counter air operations exercises a direct influence on all other operations. Therefore, counter air operations may demand the highest priority of all air operations whenever enemy air power presents a significant threat.

17. AFM 1-1, 16 March 1984, 2-12; see also Air Standardization Agreement (AIR STD) 45/4B, *Tactical Air Procedures: Counter Air Operations*, 16 December 1986, 18, paras. 502 and 601; and ATP 33(B), para. 205.

18. FM 100-20, 7.

19. AIR STD 45/4B, 18, para. 502.

20. AFM 1-1, 16 March 1984, 2-12 through 2-13.

21. *Ibid.*, 3-3 through 3-7.

22. *Ibid.*, 2-12.

23. FM 100-5, *Operations*, May 1986, 14. See also the discussion on depth, 47.

The first consideration in employing air forces is gaining and maintaining the freedom of action to conduct operations against the enemy. Control of the air environment gives commanders the freedom to conduct successful attacks which can neutralize or destroy an enemy's warfighting potential. This campaign for control is a continuous attempt to gain and maintain the capability to use the enemy's airspace to perform combat missions and to deny the enemy the use of friendly airspace. Control of the air environment enables land forces to carry out a plan of action without interference from an enemy's air forces. Without this control, tactical flexibility is lost.

24. *Ibid.*, 4.

25. *Ibid.*, 16. See also the discussion on the importance of air superiority to offensive operations and withdrawals: "Attacking forces are highly vulnerable to air attack" (p. 126), and "Since withdrawing forces are extremely vulnerable to detection and interdiction by enemy air forces, strong air defenses and air superiority in the area of the operation are highly desirable" (p. 158).

26. *Ibid.*, 47.

27. *Ibid.*

28. Defense Intelligence Agency, *NATO's Northern Army Group New Concept of Operations*, Washington, D.C., April 1982, 15.

29. Tidal W. McCoy, "Airland Battle Myths and Realities," *Aerospace Speeches, Statements, Data*, 1-7 May 1984, 3.

30. Robert S. Dudney, "The Air Force's Quandary," *Air Force Magazine*, February 1990, 14.

31. Lt Col Lynn M. Hansen, "The Resurgence of Soviet Frontal Aviation," *Strategic Review*, Fall 1978, 75.

32. *Ibid.*, 75-76.

33. Christopher Donnelly, "Soviet Fighter Doctrine," *NATO's Sixteen Nations*, May-June 1984, 64.
34. *Ibid.*
35. *Ibid.*
36. *Ibid.*, 67.
37. Secretary of Defense Frank C. Carlucci, *Annual Report to the Congress, Fiscal Year 1989* (Washington, D.C.: Department of Defense), 32.
38. M. J. Armitage, "Air Power in the Central Region," *RUSI Journal*, December 1979, 35.
39. Giulio Douhet, *The Command of the Air*, trans. Dino Ferrari (Washington, D.C.: Office of Air Force History, 1983), 24 and 192.
40. *Ibid.*
41. John A. Warden III, *The Air Campaign: Planning for Combat* (Washington, D.C.: National Defense University Press, 1988), 13.
42. Jasjit Singh, "Air Superiority: A New Look at an Old Doctrine," *Strategic Analysis*, January 1984, 857-58, see also Warden, 14.
43. Warden, 14.
44. Singh, 858.
45. Warden, 14-15.
46. Singh, 858.
47. *Ibid.*
48. Warden, 87-88.
49. Singh, 858-59.
50. Quoted in Warden, 15.
51. Office of Air Force History, *Air Superiority in World War II and Korea*, USAF Warrior Studies, ed. Richard H. Kohn and Joseph P. Harahan (Washington, D.C.: Government Printing Office, 1983), 33.
52. *Ibid.*, 32-33.
53. Brig Gen Laurence S. Kuter, deputy commander, Northwest African Tactical Air Force, to commanding general, Headquarters Army Air Forces, report, subject: Organization of American Air Forces, 12 May 1943.
54. Quoted in Warden, 15.
55. *Ibid.*, 90.
56. *Ibid.*
57. *Ibid.*, 93.
58. Quoted in Kohn and Harahan, 9.
59. Warden, 91.
60. *Ibid.*, 92.
61. *Ibid.*
62. *Ibid.*
63. *United States Strategic Bombing Surveys* (European War) (Pacific War), reprint of the Summary Reports (Maxwell AFB, Ala.: Air University Press, 1987), 37.
64. *Ibid.*, 37-38.
65. Warden, 29-30.
66. *Ibid.*, 30-31.
67. *Ibid.*, 143.
68. *United States Strategic Bombing Surveys*, 106-7.
69. Quoted in Kohn and Harahan, 9.
70. Singh, 854.
71. Quoted in Robert Frank Futrell, *Ideas, Concepts, Doctrine: Basic Thinking in the United States Air Force 1907-1960*, vol. 1 (Maxwell AFB, Ala.: Air University Press, December 1989), 172.

72. Singh, 852.
73. Kohn and Harahan, 3.
74. Ibid., 1.
75. Ibid., 63.
76. Ibid., 61-62.
77. Ibid., 74.
78. Warden, 85.
79. Ibid., 86.
80. Quoted in *ibid.*, 15-16.
81. Kohn and Harahan, 11.
82. Warden, 16.
83. Marc Clodfelter, *The Limits of Air Power: The American Bombing of North Vietnam* (New York: Free Press, 1989), ix.
84. Singh, 859.
85. Ibid.
86. Ibid., 861.
87. Robert J. Dixon, "The Range of Tactical Air Operations," *Strategic Review*, Spring 1974, 24.
88. Singh, 861.
89. Ibid.
90. Ibid., 862.
91. Ibid.
92. Ibid.
93. AFM 1-1, 16 March 1984, 1-4.
94. Warden, xxiv; see also the Congressional Budget Office, *Budget Issue Paper—Planning U.S. General Purpose Forces: The Tactical Air Forces* (Washington, D.C.: Congress of the United States, January 1977), 14.

The Air Force has long argued that, although the specific scenario will dictate how its forces are used, air superiority must be achieved before extensive air-to-ground attack in support of the Army ground forces can be undertaken. The reason underlying this argument is two fold: first, that in the early stages of a war the Air Force believes it must suppress the air threat so that it can operate relatively unhindered, keeping attrition to acceptable proportions; and second that achieving air superiority is of primary importance to the Army anyway, since it secures them from enemy air attack.

Congressional Budget Office, *Budget Issue Paper—Planning U.S. General Purpose Forces: Overview* (Washington, D.C.: Congress of the United States, January 1977), 23. "The tactical air forces have two main missions: (1) to defeat an enemy's air force and prevent it from interfering with our own air and ground operations; and (2) to attack enemy forces and installations in support of the ground forces."

## Chapter 2

# Air Base Attack

*The speed and flexibility of air operations puts a premium on gaining and keeping the initiative. Of air warfare, if anything, is the old adage true—that offense is the best defense.*

—Lord Arthur William Tedder  
Marshal of the Royal Air Force, 1947

*Overlord and Anvil will not be possible unless the German Air Force is destroyed. Therefore, my personal message to you—this is a MUST—is to "Destroy the Enemy Air Force wherever you find them, in the air, on the ground and in the factories."*

—Gen H. H. ("Hap") Arnold  
27 December 1943

Air Force doctrine strongly advocates integrated offensive and defensive counterair operations to achieve control of the air. Air base attacks are a vital part of offensive counterair operations. By taking offensive action theater commanders retain the initiative to execute all of their air, ground, and naval campaign plans. History validates the importance of offensive action and the effectiveness of air base attacks.

### Using Air Base Attacks to Maintain Control of the Air

The Air Force plans to achieve and maintain control of the air through an integrated theater counterair campaign. The counterair mission is divided into three complementary operations: offensive counterair (OCA), defensive counterair (DCA), and suppression of enemy air defenses (SEAD). OCA operations "seek out and neutralize or destroy enemy aerospace forces at a time and place of our choosing."<sup>1</sup>

#### Doctrine

Offensive counterair is the heart of Gen Giulio Douhet and General Arnold's doctrine—achieve and maintain air superiority through offensive action that destroys the enemy's aircraft "in the air, on the ground, and in

the factories.<sup>2</sup> Air Force doctrine continues to emphasize the importance of OCA operations and the vital role of air base attacks.

Until air supremacy is gained, the emphasis should be on offensive counter air operations. Air defense, while vital to the total counter air program, is a relatively inefficient means of destroying enemy air potential and by its very nature reacts only when the enemy exercises initiative action. Offensive pressure must be maintained so that the enemy is forced to withhold a significant portion of his air potential for defense of his own area.<sup>3</sup>

**Offensive actions should include attacks on enemy bases and launch facilities.** On the ground at their bases and launch facilities, aerospace forces are highly vulnerable, are often grouped together (which eases targeting), and can be neutralized through the destruction or denial of critical facilities.<sup>4</sup>

The acceptance and implementation of Air Force OCA doctrine are seen in the military strategies of the United States combatant commands. The 1985 report on *NATO Air Defense of Allied Command Europe* shows the incorporation of OCA doctrine into NATO plans.

An effective OCA operation using all means available and linked to DCA would limit the [Warsaw] Pact's tactical options and compound the enemies' offensive and defensive problems. The earlier the OCA campaign is initiated the more effective it would be. . . . If coordinated [Warsaw Pact] efforts were disrupted early, it could prove difficult or impossible for the enemy to regroup to carry out the repeated strikes on which they depend.<sup>5</sup>

Air Marshal Sir Patrick Hine, a former commander of NATO's Second Allied Tactical Air Force (2ATAF), emphasizes the absolute necessity of these air base attacks.

We cannot . . . gain a favorable air situation by remaining on the defensive alone. We would have to take [the enemy] by the throat and, as soon as we got political clearance, pin him down on his airfields through our own offensive counter air attacks. Only that way, with the right combination of offensive and defensive operations, could we begin to wrest the air initiative from the enemy.<sup>6</sup>

The importance of air base attacks, like control of the air, is recognized universally. The identical doctrine is taught at the Soviet Union's Voroshilov General Staff Academy:

Success in air operations is ensured by delivering surprise mass initial strikes on enemy airfields, where the main body of enemy aircraft is concentrated, with the first priority on enemy nuclear-armed aircraft.<sup>7</sup>

The lecture materials at the Voroshilov Academy cite the Israelis' air base attack campaign in the 1967 Middle East War as "a practical example of the successful execution of an air operation in the contemporary period" with the following lessons:

- No local war involving modern combat aircraft and air defense weapons has been fought without air strikes against enemy airfields.
- The major objective was to destroy enemy aircraft on the ground.
- The major emphasis was placed on cratering runways to prevent aircraft from taking off and landing.<sup>8</sup>

## Strategy

By attacking enemy air bases the theater commander retains the initiative and can incorporate all of the principles of war into the campaign.<sup>9</sup> Offensive action puts the commander inside the decision cycle of the enemy—setting the tempo and shaping the battle.<sup>10</sup> The commander can plan and execute attacks to exploit the speed, range, and flexibility characteristic of aircraft.<sup>11</sup> The commander can identify the centers of gravity of the enemy air campaign and concentrate forces on those critical enemy air bases when they are the most lucrative targets.<sup>12</sup>

The primary objective of the initial attacks of an air base attack campaign should be to destroy the aircraft critical to the enemy's control and exploitation of the air where they are the most concentrated and vulnerable—on the ground. If available aircraft, weapons, or command, control, communications, and intelligence (C<sup>3</sup>I) networks make this impossible, the aim of the initial attacks of the campaign should be to force those aircraft to divert to less capable alternate airfields. We can do this by denying the enemy's use of main operating bases' takeoff and landing surfaces and by disrupting the supporting infrastructure required for sortie generation. The enemy's alternate airfields will usually have:

1. Less desirable locations and commensurately decreased combat range or loiter time.
2. Less capable C<sup>3</sup>I networks, decreasing the efficiency and timeliness of follow-on mission tasking.
3. Inadequate logistics support including personnel and equipment essential to aircraft repair, replaceable avionic "black boxes," and primary munitions.
4. Insufficient numbers of aircraft shelters.
5. Decreased density and lethality of terminal defenses.

Reduced efficiency of enemy air bases is an advantage in itself as the availability and operability of air bases have often determined the tempo of past campaigns. As Lt Col Price Bingham states:

Availability of bases, especially their distance from the enemy, was often the most critical factor because of the impact on air power's effectiveness in terms of ability to reach a target, useful payload, amount of persistence, responsiveness, sortie rate, and risk of losses due to fuel considerations.<sup>13</sup>

The disruption of the enemy's theater air campaign is especially effective when the enemy's success is dependent on closely coordinated joint air, ground, and naval operations. In fact, if the enemy's doctrine and strategy are reliant on scripted and timed joint operations, as in the Soviet model, the ability to interfere with the enemy's air campaign plan may deter or defeat the entire offensive campaign. But most importantly, when over-crowded with diverted aircraft, the enemy's alternate airfields become lucrative targets for subsequent attacks.<sup>14</sup> Enemy aircraft which could not initially be destroyed at their MOBs may now be vulnerable to the counterair forces—aircraft, munitions, and C<sup>3</sup>I networks—available to the com-

mander. Making enemy aircraft vulnerable is critical because if the commander is unable to destroy the enemy's aircraft and can only deny or degrade sortie production, we must continually, perhaps daily, attack the same defended air bases and subject friendly counterair aircraft to a prohibitive cumulative attrition. Eventually, if this attrition forces the commander to stop offensive counterair operations—perhaps to reserve dual-capable (conventional and nuclear) aircraft—the enemy's ability to generate and mass forces at will could lead to his maintaining air superiority and achieving military victory. Thus, air component commanders must not only be able to force enemy aircraft to divert but must also be able to identify, target, and then attack those aircraft when they are vulnerable at alternate airfields. As Gen Franz-Joseph Schulze, former commander in chief of NATO's Central Region, stated:

Such attacks will have the greatest success when the initial strikes on Warsaw Pact MOBs are executed as an immediate response to the onset of a Warsaw Pact attack—for example, when the returning enemy aircraft of the first attacking wave are still in the air and must be diverted to dispersal operating bases. Only thus can the greatest reduction in the enemy's sortie rate be achieved. The alternate air bases are less well equipped, less well defended, and lack protective shelter, thus rendering the enemy tactical air more vulnerable.<sup>15</sup>

These attacks act as a force multiplier because they force the enemy to allocate to defensive tasks resources that could otherwise be used to execute planned initiatives.<sup>16</sup> Also these attacks quickly reduce the requirement for friendly DCA and escort aircraft by eliminating enemy interference to assigned missions and tasks. Multirole aircraft can then be tasked with offensive action; for example: close air support, interdiction, maritime operations, or strategic offensive attacks. The United States tactical air forces have 36 tactical fighter wing (TFW) equivalents (each with 72 combat aircraft): six are dedicated to close air support, eight to interdiction, and seven to air superiority, and 15 are multirole. The latter consists of such aircraft as the F-16 and the F-15E, capable of air-to-ground as well as air-to-air missions. Thus, as much as 40 percent of the Air Force's combat aircraft could switch from defensive counterair tasking to offensive action once the enemy's ability to control the air is eliminated.<sup>17</sup> As the Air Force shrinks to 30, 28, or even fewer TFWs, the ability to free an increased percentage of available multirole aircraft for offensive roles will be even more important.<sup>18</sup>

The capability to conduct an effective OCA campaign can also reduce the level of expenditures needed for air base survivability (ABS) programs as it diminishes the threat to air bases and other vital areas.<sup>19</sup> This could be critical to the United States since air base survivability was one of the programs deleted from the fiscal year 1991 defense budget.<sup>20</sup>

Air base attacks are essential when facing a numerically superior enemy. In such a case, exchange rates may mean the difference between victory or defeat. Historically, the most difficult and costly way to destroy enemy aircraft has been in air-to-air combat.

Air-to-air combat has proved to be a costly and unreliable means of achieving air superiority, particularly where the enemy possesses large and modern air forces. It is also a time consuming activity.<sup>21</sup>

The difficulty of destroying enemy aircraft in air-to-air combat is underscored by the relatively low number of American pilots who have destroyed substantial numbers of aircraft in aerial combat. Throughout US history there have been only 21 aces who have downed 20 or more aircraft. Maj Richard I. Bong is the United States' leading ace with 40 kills in World War II. In World War I, the Army Air Forces (AAF) had 31 pilots with five or more victories. In World War II, the AAF had 46 pilots with 14.5 or more victories. In the Korean War, the Air Force had 38 pilots designated as aces with five or more kills. During the Vietnam conflict, the Air Force and Navy combined had only five pilots and weapons system officers (WSO) who achieved the minimum number of five kills to qualify as aces. All of the Vietnam aces had five kills except for Capt Charles B. DeBellevue (USAF WSO) who had six victories.<sup>22</sup>

In terms of total losses and exchange rates, US air-to-air combat experience also has been remarkably constant. In Europe during World War II, the US destroyed 7,422 enemy fighters and lost 1,691 fighters for a four and two-fifths to one exchange rate. In Korea, US fighters destroyed 874 and lost 122 for a seven and one-fifth to one ratio. In Vietnam, "the total air-to-air losses for the Vietnamese was 195 (139 to the Air Force, 56 to the Navy), while the United States lost 77 (61 by the Air Force, 16 by the Navy), for a ratio of 2.53 to 1."<sup>23</sup> Only after the establishment of Teaball to give "warnings of impending MiG attack" did the ratio approach the World War II and Korea experiences of five to one.<sup>24</sup>

The Israeli 85 to zero exchange rate against Syria in June and July 1982 is often cited as evidence that defensive counterair operations are the most effective method of controlling the air. Israel shot down 85 Syrian aircraft (about equal numbers of MiG-21s and MiG-23s) with their F-15s (40 kills) and F-16s (44 kills)—23 on the first day, 15 on the second, and the remainder by the end of July.<sup>25</sup> However, there is danger in extrapolating the Israeli success to encounters between the United States and an adversary with aircraft of similar capabilities (such as the Su-27 Flanker, MiG-29 Fulcrum, or future low-observable fighters),<sup>26</sup> because "the IAF enjoyed the combined advantages of tactical initiative, numerical preponderance, superior aircraft and munitions, and a confident knowledge of where the Syrian threat would be concentrated."<sup>27</sup> The IAF monitored Syrian aircraft from the time they left their runways, used communications jamming to deny Syrian pilots any contact with their controllers, and then used their look-down radars and all-aspect missiles—which the Syrians did not have.<sup>28</sup> The effect on the Syrian pilots was summarized by Lt Gen Rafael Eitan, chief of staff of the Israeli Defense Forces (IDF): "They were very irrational in their attack on our air forces, literally bashing their heads against a wall. Anyone who crossed an imaginary line in the direction of our forces was destroyed, shot down."<sup>29</sup> The after-action reflections of an

anonymous senior IAF officer give convincing evidence that such lopsided exchange ratios cannot be assumed in other scenarios.

They could have flown the best fighter in the world, but if they flew it the way they were flying, we would have shot them down in exactly the same way. It wasn't the equipment at fault, but their tactics. . . . The problem was that [Syrian] pilots didn't do things at the right time or in the right place. They flew in a way very difficult to understand. . . . The pilots behaved as if they knew they were going to be shot down and waited to see when it was going to happen and not how to prevent it or how to shoot us down.<sup>30</sup>

Alternatively, air base attacks that destroy enemy aircraft on the ground can provide high kill rates, high total kills, and low loss rates. There are numerous examples of effective air base attack campaigns. During Operation Barbarossa, the Luftwaffe employed 1,400 combat aircraft (650 fighters) against 7,000 Soviet combat aircraft. The Luftwaffe's counterair campaign was aimed at 31 airfields, and aircraft on the ground as well as in the air. The results were dramatic. "By the end of the day [22 June 1941] 1489 Soviet aircraft had been claimed on the ground and 322 shot down. By the end of the second day, the Soviet Air Force had lost over 2000 aircraft."<sup>31</sup> Between 22 and 30 June the Luftwaffe destroyed more than 4,000 Soviet aircraft.<sup>32</sup>

In the Pacific theater in World War II, Japan neutralized US Army and Navy air power with preemptive airfield attacks in Hawaii and the Philippines. At 7:57 A.M. on 7 December 1941, Japanese fighters attacked first Hickam Field and then Wheeler Field in Hawaii. When these attacks were finished, "ninety naval aircraft were destroyed and the army lost seventy-seven with another 128 damaged."<sup>33</sup> Eight hours later Japanese fighters attacked American aircraft still parked in neat rows at Clark and Iba airfields in the Philippines.

Before they departed the Far Eastern Air Force had ceased to exist as a fighting unit. Eighteen B-17s, fifty-six fighters, twenty-five other aircraft and numerous installations were knocked out. So was Cavite Navy Yard a few days later and then the patrol bombers of the Asiatic Fleet. The sky over the Philippines and the air around it belonged to Japan.<sup>34</sup>

Gen George C. Kenney regained American air superiority in the Pacific by attacking Japanese air bases and destroying the enemy's aircraft on the ground. A notable example was the raids on the Japanese air base at Wewak which destroyed more than 100 aircraft on the ground and gave the Americans control of the air over eastern New Guinea.<sup>35</sup> In the Korean War, Generals Otto P. Weyland and James E. Ferguson attacked North Korean airfields to protect the Eighth Army.<sup>36</sup> In the 1967 Middle East War, Israel eliminated both the Egyptian and Syrian air forces on the first day of the war.

Israel launched coordinated precision attacks on Egyptian air power (against runways, radar stations and aircraft on airfields and in the air) followed by similar attacks against Jordan and Syria later in the day. By the end of the day 240 Egyptian, 45 Syrian, 16 Jordanian and 7 Iraqi aircraft were destroyed, 30 of them in the air. Israeli

Air Force had flown nearly 1000 sorties losing 20 aircraft, and only one (a Vatour) in air combat.<sup>37</sup>

By the end of the second day Israel's 196 aircraft had "destroyed almost 400 Arab aircraft on the ground."<sup>38</sup> Finally, the effectiveness of air base attacks in destroying aircraft in the open was demonstrated on 15 April 1986 by the United States Air Force and Navy attacks on the Libyan Tripoli and Benina airfields—televised news coverage around the world showed Soviet-built Ilyushin Il-76 (NATO Candid) transport aircraft exploding on the ramp.<sup>39</sup> In fact, if commanders do not take and retain the initiative with air base attacks, especially when outnumbered, victory may elude them, for "unless **offensive** action is initiated, military victory is seldom possible."<sup>40</sup>

Control of the air can be gained either by offensive action to destroy the enemy's capability to contest air superiority or by reliance on defensive umbrellas of fighter combat air patrols to provide control only when and where it is needed. However, if control of the air is to be decisively attained, it must be attained by destroying the enemy in his territory.<sup>41</sup> "Decisive offensive actions win wars, defensive actions only prolong them."<sup>42</sup> If we are to destroy enemy fighter aircraft before they can be employed at the time of the enemy commander's choosing, we must either destroy them on the ground or force the enemy to engage in air-to-air combat at a disadvantage. Since the enemy may choose not to engage under adverse conditions, air base attacks are a necessity.

In many scenarios it is also essential that we use offensive action to deny the enemy the ability to control the air because there are not enough dedicated or multirole air-to-air fighter aircraft to provide defensive umbrellas everywhere they are required. Since all Air Force missions except for defensive counterair (strategic aerospace offense, offensive counterair, suppression of enemy air defenses, air interdiction, battlefield air interdiction, close air support, and reconnaissance) take place in enemy territory either general air superiority over enemy territory or fighter escort for these missions is required. The limited number of available escort aircraft alone could prevent the exclusive use of escort.

In addition, advanced enemy surface-to-air defensive systems and fighter aircraft have made general air superiority preferable to fighter escort for two tactical reasons. First, the majority of such tactical aircraft as the F-111, F-15E, and F-16 will continue to penetrate enemy territory at low altitudes and high speeds for the foreseeable future—the second-generation stealth F-117 and the fifth-generation stealth advanced tactical aircraft (ATA)/A-12 may be exceptions.<sup>43</sup> If capable, they will capitalize on surprise with night attacks while in or under the weather to increase their probability of surviving encounters with air-to-air fighters and surface-to-air defensive systems. Escort fighters for low-altitude penetrators must also penetrate at a low altitude, lest they be subject to the enemy's lethal surface-to-air defensive systems or negate the attack package's element of surprise.<sup>44</sup> At a low altitude, escort fighters are at a distinct disadvantage when facing

fighter aircraft with similar capabilities—such as aircraft with all-aspect, beyond visual range (BVR), look-down, shoot-down missiles—who are free to use medium altitudes which extend their search and engagement ranges. Second, enemy fighters have the advantage of choosing lucrative engagements while the escort's task is not to destroy enemy fighters but rather to ensure the penetrating package's survival.

In addition to escort duties, the limited number of fighters available must also provide defensive combat air patrols for such high-value airborne assets as the airborne warning and control system (AWACS); airborne command, control, and communications (ABCCC); tanker aircraft; and electronic warfare platforms, including the RC-135 Rivet Joint, EC-130 Compass Call, and EF-111 Raven that will be in medium altitude orbits over friendly territory. Finally, fighters must control the air over the close battle area to ensure that Army units on the modern fluid battlefield are free from air attack while defending the airspace over rear area air bases, ports, staging areas, and headquarters.

The Air Force is developing the fifth-generation stealth advanced tactical fighter with low observability, good aerodynamic performance, supersonic cruise, and high maneuverability to regain the ability to penetrate enemy territory on fighter sweeps or escort missions.<sup>45</sup> The ATF will make a vital contribution to the Air Force's ability to conduct an integrated defensive and offensive counterair campaign for air superiority by reestablishing the synergistic relationship of air base attack, fighter sweeps, and escort. Air base attacks will remain an important part of an offensive counterair campaign even after the ATF is fielded, especially as potential adversaries acquire aircraft with similar capabilities, but until then air base attacks are essential.

### **Advantages of Air Bases Safe from Attack**

In *The Air Campaign*, John A. Warden analyzes previous air campaigns by considering the effect on control of the air and military victory of one adversary's ability—capability and will—to take offensive action against the enemy's air bases. He concludes that if one adversary is able to attack airfields while the enemy is unable or unwilling to do the same, there is "the opportunity for decisive action—action so decisive that the war can theoretically be won from the air."<sup>46</sup>

Warden defends his thesis by citing the Anglo-American offensive against Germany from 1943 to 1945. Since the Allied bases in the United Kingdom, and in France after Normandy, were safe from attack, they were able to hold the Luftwaffe at risk.<sup>47</sup> The decimation of the Luftwaffe made Hitler's defeat inevitable. Similarly in the Pacific theater, Generals Douglas MacArthur and Kenney used secure air bases to prosecute an offensive counterair campaign that gave them air supremacy and contributed to Japan's unconditional surrender.

### **Hazards of Enemy Bases Safe from Attack**

Warden also describes the reverse situation where friendly airfields are at risk while friendly forces are either unable or unwilling to attack enemy airfields—this “air superiority battle [is] the toughest to win, but the consequences of losing it are the most severe, as loss of the entire war becomes quite likely.”<sup>48</sup> The truth of this corollary is seen in the experiences of Poland, Great Britain, and France in World War II, as well as North Korea, the Arab nations in 1967 and 1973, and North Vietnam. All were unable or unwilling to attack the sources of their enemy’s air power and suffered drastic consequences. All except Great Britain lost control of the air.<sup>49</sup>

Consequently, Poland and France quickly capitulated in World War II. In Korea, the American Air Force was able to support the Army’s withdrawal to Pusan, the Inchon counteroffensive, and helped to bring about an armistice with an interdiction and strategic offensive bombing campaign in North Korea. In the Middle East conflicts, Israel defeated numerically and qualitatively superior forces. “Finally, the North Vietnamese were unable to conduct a successful conventional offensive as long as American air power was stationed in Indochina.”<sup>50</sup>

### **Allowing Sanctuary to Enemy Airfields**

In two of the conflicts cited, Korea and Vietnam, the United States allowed sanctuary to enemy airfields in China. In both instances the enemy chose not to capitalize on his freedom from air attack to contest air superiority.<sup>51</sup> Gen William W. Momyer observes that if the enemy had taken advantage of the sanctuary afforded air bases in China during either the Korean or Vietnam wars, the rules of engagement would have had to be reconsidered.

You had air superiority in two aspects: one of containment [Korea] and the other by virtue of default [Vietnam]. He didn't challenge you. You accomplished the basic purpose that you were trying to achieve. You gave your ground forces and naval forces freedom of action without interference. So you accomplished the basic purpose of air superiority. On the other hand, if you postulate a situation where he has got a significant size air force and he operates that air from sanctuaries and he is willing to use that air against your facilities and so forth, then you are confronted with an entirely different circumstance. If you can't go at his bases and he has complete freedom of operation to attack your bases, then you are forced into a position of attrition. And I am not sure that you are going to win that type of a battle. If you can't really win that kind of an air battle, it's questionable whether you can really continue to do ground and sea operations.<sup>52</sup>

### **Future of Air Base Attack**

An offensive counterair capability, including air base attacks, will be equally important in future conflicts because the Air Force must be prepared to face numerically superior air forces equipped with aircraft possessing similar capabilities.<sup>53</sup> In his 1986 paper, *The Outlook for Tactical Airpower in the Decade Ahead*, Benjamin Lambeth states that “the

inexorable development of a more challenging threat (both air-to-air and air-to-ground) as Soviet capabilities improve is confronting Western air forces with a Hobson's choice.<sup>54</sup> Forces unable to compete quantitatively and finding that the

emergence of very capable fighters like the MiG-29, the growing proliferation of increasingly lethal enemy surface-to-air defenses, and the impending acquisition of beyond visual range (BVR) point-and-shoot missiles by potential enemies will rule out easy "quality"-based solutions.<sup>55</sup>

The size of the USAF fighter force facing this threat will continue to decline, perhaps substantially, because of decreasing defense budgets and increasing cost of fighter aircraft. The cost of fighter aircraft increased 100 times in the two decades following World War II and has increased exponentially since then.<sup>56</sup> The price of a typical fighter aircraft in the 1980s was between \$15 and \$30 million, and the F-22/23 advanced technology fighter and the A-12 advanced technology aircraft programmed for the next decade are estimated to cost between \$45 and \$100 million per aircraft.<sup>57</sup> Because this exponential increase in the price of fighter aircraft is occurring within the fiscal constraints of a decreasing defense budget, the future USAF will undoubtedly have fewer air-to-air and air-to-ground fighters.

Even so, US superpower responsibilities in the developing international environment could require elements of this smaller force to deploy to any area of the globe or to several areas simultaneously. Upon arrival the fighter force can expect to face not only superior numbers of enemy aircraft but also an enemy with the advantage of operating from their own main operating bases. To control the air, deployed fighters will have to locate, identify, and engage enemy aircraft of similar capabilities that are either designed with low-observable technology or that use high speeds and very low altitudes.<sup>58</sup> Against such an adversary "attrition strategies will be both inappropriate and ill-advised, since with comparable equipment, the side with greater numbers will enjoy the advantage in offensive staying power."<sup>59</sup>

However, an enemy with greater numbers of aircraft similar to ours will probably try to use attrition strategy because of the tactical advantages inherent in superior numbers. "Numerical superiority goes a long way in conferring and exploiting positional advantage in air warfare."<sup>60</sup> Because of the development of beyond-visual-range launch and maneuver missiles, positional advantage will be even more critical in future air-to-air combat than it was when aircraft were restricted to gun kills.

The effectiveness of each fighter as it faces superior numbers of equally capable aircraft will also be dependent on the rules of engagement (ROE); for example, the procedures required for identification of a bogey as friend or foe before using BVR missiles. If BVR engagements are authorized only after positive identification, the fighter's capability to achieve it and the enemy's capability to use countermeasures to degrade a timely identification must be considered.<sup>61</sup> Finally, the fighter's air-to-air missiles may limit its effectiveness either through their availability, designed performance characteristics, or degraded performance due to enemy countermeasures.<sup>62</sup>

Air-to-air combat will remain a difficult task, but each penetrating enemy attack aircraft friendly forces do not engage will be more lethal because of the precision guidance of the standoff weapons possible with emerging technology.<sup>63</sup> For example, Seymour Deitchman in *New Technology and Military Power: General Purpose Military Force for the 1980's and Beyond* reports that in World War II it took 100 aircraft 35 days to kill 1,000 vehicles, but in the 1970s 100 aircraft could kill the same number of vehicles in one and a half days.<sup>64</sup> Improvements in weapons technologies and guidance systems will further increase the effectiveness of penetrating aircraft.<sup>65</sup> One example is the multiple kills per pass anticipated with the independently guided Skeet warheads of the USAF's sensor fuzed weapon (SFW) now in development.

Air base attacks that quickly gain control of the air can raise the nuclear threshold in conventional warfare. The pillars of NATO's military strategy—forward defense to allow reinforcement, follow-on forces attack (FOFA) to isolate the battlefield, and flexible response with nuclear weapons to show resolve—are typical of the conventional and tactical nuclear warfare strategies of the United States combatant commands. The success of such strategies depends on air superiority. In support of forward defense, "one of the first and most critical demands on NATO strike aircraft would almost certainly be for anti-tank battlefield support," which requires air superiority over the battlefield.<sup>66</sup>

Isolating the battlefield will be critical since the "high rates of consumption on the firepower-intense mechanized-force manoeuvre-oriented battlefield [will] increase the quantum and importance of logistics resupply."<sup>67</sup> This will require air superiority deep into enemy territory to give the freedom to attack the vehicles, tactical airlift, and helicopters required for logistic resupply.<sup>68</sup> The importance of achieving the control of the air that enables the isolation of the battlefield is underscored by Brigadier General Bidwell's assertion in *Modern Warfare* that "a sustained armoured offensive was almost impossible in the face of attack by an air force with command of the sky."<sup>69</sup>

An adversary who believes his opponent does not have a responsive counterair capability could have "the confidence he could achieve a rapid air superiority with a low-risk probing attack and then follow with full scale aggression."<sup>70</sup> The resulting loss of air superiority and subsequent failure of forward defense and FOFA operations would then lead to an early nuclear response. As the fiscal year 1989 DOD annual report to Congress states, "In the event of war in Europe, NATO could face the difficult choice of early escalation to the use of nuclear weapons or suffering a conventional defeat in Europe's critical Central Region."<sup>71</sup>

The Air Force no longer possesses the capability to conduct effective air base attack campaigns against hardened and defended main operating bases to gain control of the air quickly. However, the Air Force can regain this capability with the new aircraft, standoff weapons, and C<sup>3</sup>I promised by emerging technology. The next chapter discusses the limitations of

today's counterair forces, the failure of past initiatives to regain an effective air base attack capability, and the promise emerging technology holds for the twenty-first century.

#### Notes

1. AFM 1-1, *Basic Aerospace Doctrine of the United States Air Force*, 16 March 1984, 3-3.
2. H. H. Arnold, speech to commanders of Eighth and Fifteenth Air Forces, 27 December 1943; see Robert Frank Rutrell, *Ideas, Concepts, Doctrine: Basic Thinking in the United States Air Force, 1907-1960*, vol. 1 (Maxwell AFB, Ala.: Air University Press, December 1989), 153.
3. AFM 2-1, *Tactical Air Operations—Counter Air, Close Air Support and Air Interdiction*, 2 May 1969, 5-3.
4. AFM 1-1, "Basic Aerospace Doctrine of the United States Air Force," draft, January 1990, vol. 1:3-2.
5. Department of Defense, *NATO Air Defense of Allied Command Europe (U)*, May 1985, III-4. (SECRET) Information extracted is unclassified. See also Gen Charles A. Gabriel, "The Central Region Air Battle," *NATO's Fifteen Nations*, Special Issue No. 2, 1981, 27. General Gabriel was then commander, Allied Air Forces Central Europe (AAFCE), and commander in chief, United States Air Forces in Europe (USAFE). General Gabriel states:

We must pose the OCA threat not only because this in itself will inhibit enemy sortie generation rate, but also because the enemy is forced to concentrate on defensive employment of his own resources. OCA therefore has the indirect benefit of reducing the weight of air attack on our air assets as well as on our land forces.

See also Franz-Joseph Schulze, "Rethinking Continental Defense: Coalition Defense Structure, Tactics, and Technologies," *NATO: The Next Generation* (Boulder, Colo.: Westview Press, 1984), 120. General Schulze, former commander in chief of NATO's Central Region, states that "direct attacks on the enemy's Main Operating Bases (MOB) offer the single most effective means of defeating Warsaw Pact air power."

6. John M. Halliday, "Tactical Dispersal of Fighter Aircraft: Risk, Uncertainty and Policy Recommendations," *Rand Note* (Santa Monica, Calif.: Rand Corp., 1987), 44-45.

7. Rodney S. Crist, *Air Superiority: A Case Study* (Newport, R.I.: Naval War College, 16 February 1988), 21.

8. *Ibid.*

9. AFM 1-1, 16 March 1984, 2-4. The principles of war are: objective, offensive, surprise, security, mass and economy of force, maneuver, timing and tempo, unity of command, simplicity, logistics, and cohesion. Offensive action also gives the agility, initiative, depth, and synchronization which are the tenets of AirLand Battle doctrine and are equally applicable to planning air campaigns.

10. Charles M. Burke and J. Michael Pulliam, *Air Maneuver: A Competitive Strategy Now for the Operational Level Fight* (Carlisle Barracks, Pa.: Army War College, 30 March 1988), 1. Burke and Pulliam consider the employment of new helicopters from an operational-level perspective. Their concept is equally relevant for fighter aircraft tasked for air base attack. They recommend emphasizing speed, agility, ability to mass, and extended-range weapons against enemy weaknesses.

11. AFM 1-1, 16 March 1984, 2-2.

12. R. Moody Suter, *Tactical Fighter Symposium Final Report (U)* (n.p.: Tactical Air Command, 1976), 2-179. (SECRET) Information extracted is unclassified. Lieutenant Colonel Suter's conclusions on the need for offensive counterair are just as valid today as in the foreseeable future.

The limitations of defensive counter air operations are fairly well understood. Since they are reactive in nature, they give away the major advantages unique to airpower. Offensive counter air, however, offers the ability to wrest the initiative from an attacking force. It can, with proper planning, capitalize on surprise and shock and stymie the Soviet air operations plan. It allows forces to be massed for maximum effect.

13. Lt Col Price T. Pugram, "Point Paper on Doctrinal Implications, The Air Base of the Future," lecture, Air University, Maxwell AFB, Ala., 30 March 1990, 1; see also Bingham, "Operational Art and Aircraft Runway Requirements," *Airpower Journal*, Fall 1988, 52-69.

14. This method of destroying enemy aircraft is recommended by the European Security Study's report, *Strengthening Conventional Deterrence in Europe: Proposals for the 1980s* (New York: Saint Martin's Press, May 1983), 21-22.

Counter-air operations seek to reduce the magnitude of the Warsaw Pact air threat. This can be done by large scale and persistent attacks on Pact airbases in order to reduce its capability to generate aircraft sorties. This offers the most effective means of defeating Warsaw Pact air power. Direct attacks on Warsaw Pact Main Operating Bases, particularly before the return of deployed aircraft, can force diversion to alternative airfields which are less well equipped, lack protective shelters, and have fewer runways. On these alternative airfields, the greater vulnerability of Warsaw Pact aircraft could be exploited through attacks by unjoined NATO aircraft. Together, these operations could materially reduce Warsaw Pact sortie rates. The initial strikes on Warsaw Pact Main Operating Bases must take place as an immediate response to the onset of a Warsaw Pact attack.

The same method is predicted in Headquarters Tactical Air Command, *Project Future Tactical Air Forces 1995-2000* (U), 1985. (SECRET) Information extracted is unclassified. It is also integral to NATO's counterair strategy and the Pentagon's new Competitive Strategies doctrine which had the following description in Benjamin Schemmer, "Stronger Warsaw Pact Runways Cause USAF to 'Cancel' Airfield Denial Weapon," *Armed Forces Journal International*, August 1989, 22.

"Competitive Strategies" doctrine calls for swarms of NATO interdiction aircraft to attack Warsaw Pact airfields while its fighters are engaging the first waves of the expected Soviet/Pact offensive air operation, making it impossible for enemy aircraft to land, rearm, and refuel--except on less well-defended and less well-stocked secondary airfields.

15. Schulze, 120.

16. Jasjit Singh, "Air Superiority: A New Look at an Old Doctrine—II," *Strategic Analysis*, February 1984, 953. Air base attacks have

a definite advantage in tying down a fair proportion of air power resources for the air defense of the base which must wait to produce a response while the strike force retains the initiative of time, place, intensity and frequency of attack.

17. Secretary of Defense Richard Cheney, *Department of Defense, Annual Report to the Congress, Fiscal Year 1991* (Washington, D.C.: Department of Defense, January 1990), 43.

18. Michael R. Gordon, "Cheney Proposes Sharp Reduction in New Warplanes," *New York Times*, 27 April 1990, A10.

19. Department of Defense, *NATO Air Defense of Allied Command Europe* (U), 15 May 1985, III-1. (SECRET) Information extracted is unclassified.

20. *Air Force Policy Letter for Commanders*, March 1990, 1.

21. Malcolm English, "Air Weapons the Equalizers," *Air Pictorial*, October 1980, 62.

22. "Air Force Magazine's Guide to Aces," *Air Force Magazine*, May 1989, 58, and May 1990, 56.

23. Robert Frank Futrell, *Ideas, Concepts, Doctrine: Basic Thinking in the United States Air Force, 1961-1984*, vol. 2 (Maxwell AFB, Ala.: Air University Press, December 1989), 298.

24. Ibid. The Air Force's ratio overall was in fact 2.28 to 1, while the Navy's was 3.5 to 1.

25. Benjamin S. Lambeth, *Moscow's Lessons from the 1982 Lebanon Air War* (Santa Monica, Calif.: Rand Corp., September 1984), 9-10.

26. Larry D. Welch, "The Air Force Aerospace Defense for the Future," *Defense 89*, May-June 1989, 32. General Welch, chief of staff US Air Force, states:

[Soviet] forces, which now include highly maneuverable fighters armed with look-down/shoot-down ordnance, are increasingly comparable to current Air Force systems. These advanced aircraft threaten the Air Force's ability to provide the air superiority that gives freedom of action to all theater forces.

See also David Fulghum, "Cheney Offers Big B-2 and C-17A Cuts, ATF Delays," *Air Force Times*, 7 May 1990, 3.

Cheney said the Soviets are building increasing numbers of MiG-29 Fulcrum and Su-27 Flanker fighters that are equal to U.S. first-line fighters. The next generation of Soviet fighters, he said, will be even more capable. The Soviet Counter Air Fighter and the Air Superiority Fighter will have stealth characteristics, carry air-to-air missiles effective at any angle, have radar that can pick up low-flying aircraft, employ integrated electronics, be more maneuverable and have a range of more than 500 miles.

27. Ibid., 8.

28. Ibid., 8-9.

29. Paul S. Cutter, "Lt Gen Rafael Eitan: 'We Learned both Tactical and Technical Lessons in Lebanon,'" *Military Electronics/Countermeasures*, February 1983, 101.

30. Lambeth, "Moscow's Lessons," 10.

31. Ibid., 858.

32. John A. Warden III, *The Air Campaign: Planning for Combat* (Washington, D.C.: National Defense University Press, 1988), 23, 42.

33. Robert Leckie, *Delivered from Evil: The Saga of World War II* (New York: Harper and Row, 1987), 342.

34. Ibid., 351.

35. Ibid., 562.

36. Office of Air Force History, *Air Superiority in World War II and Korea*, USAF Warrior Studies, ed. Richard H. Kohn and Joseph P. Harahan (Washington, D.C.: Government Printing Office, 1983), 74-75.

**Ferguson:** We had sufficient freedom of activity up to the Yalu River that we could monitor on a day-to-day basis the construction or reconstruction of airfields, and when they got to a length of three thousand feet, off went a B-29 or two and "postholed" the repairs. Then it was out of commission for six weeks or two months.

37. Jasjit Singh, "Air Superiority: A New Look at an Old Doctrine—I," *Strategic Analysis*, January 1984, 860.

38. Warden, 42.

39. "U.S. Demonstrates Advanced Weapons Technology in Libya," *Aviation Week and Space Technology*, 21 April 1986, 21; see also "Libyan SAM Missiles Hit Civilian Areas, Says USA," *Jane's Defence Weekly*, 26 April 1986, 737. US assessments of the attacks were three to five IL-76s destroyed at Tripoli and at least four MiG-23 Floggers, two Mi-8 Hip helicopters, and two F-27 Fokker transports at Benina. Television coverage of the Tripoli attack and bomb damage assessment was possible with the F-111 Pave Tack and A-6 TRAM infrared video displays.

40. AFM 1-1, 16 March 1984, 2-6.

41. Singh, "Air Superiority—I," 863.

42. Suter, 2-179.
43. *Air Force Policy Letter for Commanders*, November 1989, 2.
44. *Ibid.*, 1. The Air Force fiscal year 1991 budget deleted the airborne self-protection Jammer. This system was designed to provide protection to fighter aircraft.
45. *Ibid.*, 2.
46. Warden, 39.
47. *Ibid.*
48. *Ibid.*, 65.
49. Although Britain successfully conducted an exclusively defensive counterair campaign it can be argued that Britain would have lost control of the air if the German campaign objectives had not been changed from RAF Fighter Command to attacks on London. See Singh, "Air Superiority—I," 858.
50. See also the perspective of General Momoyer in *Air Superiority in World War II and Korea*, 47.
- Momyer:** Actually they started out with bringing the RAF fighter command up to engage and suffer attrition; they also went at the airfields, at the radar and command and control. The whole concept was that they could gain air superiority in a relatively short period of time. Adolf Hitler wasn't willing really to pursue that, and he shifted the target system. . . . If the German air force had pursued the same sort of doctrine as in Poland, the same sort of doctrine that had been pursued in France, which was to gain air superiority over the battlefield—and the same thing that had been pursued in the first campaigns against the Soviet Union—the outcome in the Battle of Britain might have been different.
51. Warden, 16.
52. Kohn and Harahan, 77. General Momoyer: "The Soviets didn't want to overtly get engaged. So we had an artificial condition that led to that containment of air superiority along the Yalu."
53. *Ibid.*, 86.
54. Welch, 32; see also Fulghum, 3.
55. Benjamin S. Lambeth, *The Outlook for Tactical Airpower in the Decade Ahead* (Santa Monica, Calif.: Rand Corp., 1986), 4.
56. Singh, "Air Superiority—I," 855.
57. Gregory F. Treverton, "The Defense Debate," *Foreign Affairs* 69, no. 1 (1990): 194; see also "AF Pushes to Retain ATF Despite Rising Price Tag," *Air Force Times*, 2 April 1990, 27; and Bill Sweetman, "Austere ATF May Smooth Funding," *Jane's Defence Weekly*, 17 February 1990, 303. Sweetman reports that the Air Force ATF requests for proposal (RFP) "may call for an 'austere' initial production version, lacking features such as the electro-optical surveillance system, the active-array radar and vectored thrust nozzles." If the flyaway cost was \$40 million in 1985 dollars—the Air Force's best estimate based on production of 70 aircraft per year—and 50 aircraft a year were produced, the "unit program cost is \$107 million."
58. For the price of the ATA, see David Fulghum, "Cheney: 75 B-2s Needed for Credible Force," *Air Force Times*, 7 May 1990, 77. During a Senate hearing Cheney gave the first official figures on the cost of the A-12—\$84 million per aircraft. The cost for the F-117A stealth fighter produced between 1982 and 1990 was \$46.2 million per aircraft. David Fulghum, "F-117A Pilots Laud, Defend 'the Black Jet,'" *Air Force Times*, 7 May 1990, 20. Similarly, John Boatman, "Five B-2s Ordered, New Weasel Axed," *Jane's Defence Weekly*, 3 February 1990, 179, reports that the Air Force's purchase of its last 36 F-15E aircraft in fiscal year 1991 will cost \$51.25 million per aircraft. The increasing cost of the ATF, ATA, F-117, and F-15E can be compared to Boatman's cited fiscal year 1991 purchase of 150 F-16s for \$19.8 million per aircraft.
59. Singh, "Air Superiority—II," 947.

59. Lambeth. *Outlook*, 4.
60. Singh, "Air Superiority—II," 949.
61. *Ibid*; see also Benjamin Schemmer, "Arms Control Impact and Status of 'Black' Programs Concern Bush Team," *Jane's Defence Weekly*, March 1989, 24.
62. Singh, "Air Superiority—II," 950.
63. *Ibid.*, 946.
64. Quoted in *ibid.*, 943.
65. *Ibid.*
66. English, 388.
67. Singh, "Air Superiority—II," 942.
68. *Ibid.*
69. Quoted in *ibid.*, 942.
70. Kurt F. Buckley, "Integrated Air Superiority," *NATO's Sixteen Nations*, May-June 1984, 61.
71. Secretary of Defense Frank C. Carlucci, *Annual Report to the Congress, Fiscal Year 1989* (Washington, D.C.: Department of Defense, 1988), 33.

## Chapter 3

# Emerging Technology

*National safety would be endangered by an air force whose doctrines and techniques are tied solely to the techniques and processes of the moment. Present equipment is but a step in the progress, and any air force which does not keep its doctrines ahead of its equipment, and its vision far into the future, can only delude the nation into a false sense of security.*

—Gen H. H. Arnold  
*Third Report to the Secretary of War*

The Air Force does not currently possess the capability to conduct an effective air base attack campaign designed to destroy the enemy's aircraft on the ground. The Israeli success in eliminating the Egyptian Air Force in the 1967 Arab-Israeli War precipitated the development of the modern main operating base (MOB) where aircraft are hidden and protected in hardened shelters and defended by a variety of lethal short-range defensive systems. In the foreseeable future, military aircraft will continue to depend on MOBs, but the air base attack mission will be more difficult because terminal defensive systems for those bases are expected to increase in lethality—including perhaps the addition of directed-energy weapons such as destructive lasers.

## Current Capabilities

Because they have been denied the ability to destroy aircraft on the ground, air forces of all nations have alternatively planned to deny runways and disrupt sortie generation.<sup>1</sup> They have developed weapons to crater airfield runways and have planned attacks on the air base's supporting infrastructure—for example, aircraft maintenance facilities, fuel supplies, and munitions.<sup>2</sup> Examples of munitions created specifically to crater runways are the German MW-1 multipurpose weapon designed for the Tornado aircraft, the British JP 233 airfield attack weapon, and the French BAP 100-mm cratering bomb (Bombe Antipiste) and Durandal penetration bomb. However, the strategies of denying runways and disrupting sortie generation are limited in effectiveness because these strategies require repeated attacks to maintain constant denial of runway surfaces, vital facilities, and supplies. Also, if the counterair forces are limited to weapons requiring delivery from within the MOB's defensive environment, they are

subject to a cumulative attrition that can quickly become unacceptable.<sup>3</sup> This is the current position of the USAF because it does not have standoff weapons capable of efficiently killing multiple numbers of sheltered aircraft, denying runway surfaces, or destroying those parts of a hardened base's infrastructure vital to sortie generation.<sup>4</sup>

The USAF has limited quantities of only one type of runway cratering munition, the 500-pound French Durandal.

It is generally considered a cumbersome weapon for its intended purpose because it is a large unitary weapon—each one making only one hole—requiring many sorties before a runway is covered with enough holes to make it unuseable over its entire length. It is also not suitable for use as a guided weapon in its current form.<sup>5</sup>

Durandal must be released while the delivering aircraft flies directly over the target within the range of small arms, antiaircraft artillery (AAA), and optical, radar, and infrared (IR) guided surface-to-air missiles (SAM). Durandal is not used by the French air force, which prefers the Thomson-Brandt BAP 100, but is exported by its manufacturer, Matra, to six countries besides the United States.<sup>6</sup> The United States purchased Durandal in 1985 as a near-term solution after deciding to stop its participation in the development of the British JP 233 and the US boosted kinetic energy penetrator (BKEP), which was part of the direct airfield attack cluster munitions (DAACM) program that failed to develop quickly.<sup>7</sup>

For the present, Durandal remains the Air Force's only runway cratering munition because contractor source selection for full-scale engineering development of the DAACM was canceled on 15 June 1989.<sup>8</sup> The DAACM was designed as a direct overflight runway cratering and denial weapon, containing eight BKEPs and 24 HB-876 aerial denial mines to disrupt runway repair operations. The DAACM program, which began in 1984, was originally scheduled for full-scale development in 1986 and was to have started production of up to 20,000 units in late 1991.<sup>9</sup> The Air Force's program manager stated that the DAACM was expected to have three times the effectiveness of Durandal, using airfield closure time for a given number of sorties as a criterion.<sup>10</sup> In tests the BKEP created holes in simulated Warsaw Pact runways that were eight to 12 feet in diameter.<sup>11</sup> The newsletter *Aerospace Daily* reported that source selection was canceled because "new Soviet countermeasures have made the weapon ineffective without a redesign."<sup>12</sup> The Air Force said it will test the BKEP against tougher targets in early 1990 to "determine the future actions needed to counter the threat and the future of the DAACM concept and program."<sup>13</sup> However, the DAACM may not reach production because this overflight weapon, which could not be operational until the mid-1990s, may become obsolete if a competing standoff weapon is produced that can dispense similar runway cratering and denial submunitions "after being released from an aircraft miles away from its target."<sup>14</sup>

Similarly, the available general-purpose (GP) bombs USAF counterair aircraft could use against an air base's shelters or hardened infrastructure are ineffective unless released in the heart of the lethal envelope of an air

base's terminal defensive systems. To drop the unguided GP bombs, aircraft must use vulnerable diving deliveries to ensure both the accuracy to hit point targets and the proper impact angles and velocities to destroy hardened structures.<sup>15</sup> The USAF's low-level laser-guided bombs (LLLGB)—some of which have an improved 2,000-pound (I-2000 P3I) warhead to penetrate hardened structures—can be released with a standoff delivery, but the delivering aircraft must be equipped with a Pave Tack (F-111F) or low-altitude navigation and targeting infrared for night (LAN-TIRN) (F-15E and F-16C) laser designation pod.<sup>16</sup> The aircraft must maintain line of sight with the target, and thus the target's terminal defenses, as it illuminates the target with a laser spot until the weapon's impact. Throughout this time the delivering aircraft is vulnerable to terminal defenses. The only USAF bomb that a counterair aircraft can release from outside terminal defenses and guide while it egresses safely is the television or imaging infrared (IIR) GBU-15, but this expensive specialized munition is only available in very limited quantities and can only be guided by a data-link aircraft (F-111F or F-15E) with a specially qualified aircrew.<sup>17</sup>

In addition, all unguided GP bombs, LLLGBs, and GBU-15s are inefficient because they can only destroy one hardened point target—aircraft shelter or hardened facility—per release. The delivering aircraft's vulnerability to terminal defenses and the inefficiency of one kill per release—combined with the uncertainty of targeting shelters or hardened facilities that may or may not contain critical enemy aircraft, equipment, supplies, or personnel—have eliminated destruction of sheltered aircraft and hardened infrastructure as a practical course of action for today's counterair forces.

## Future Offensive Counterair Missions

Numerous Air Force, Office of Secretary of Defense, and independent studies in the past 15 years have noted the growing disparity between the Air Force's doctrine of conducting air base attacks to destroy the enemy's critical aircraft on the ground and the counterair force's actual ability to carry out this doctrine. Such studies have advocated using technology to regain the ability to execute air base attacks effectively. Emerging technology now promises to deliver the long-awaited, capable, affordable, and reliable aircraft; standoff weapons; and command, control, communications, and intelligence (C<sup>3</sup>I) networks called for and anticipated in these studies. Emerging technology was broadly defined in Secretary of Defense Caspar Weinberger's *Annual Report to the Congress, Fiscal Year 1985*, as "near-term technology, that could improve significantly conventional-force capabilities."<sup>18</sup> The United States Congress, Department of Defense, and US Air Force must jointly ensure that the capabilities essential for Air Force execution of its proven doctrine—air base attacks to achieve control of the air—are funded in the midst of competing national, defense, and Air Force

priorities and the smallest defense budget since World War II.<sup>19</sup> Whether the United States is victorious or defeated in a future military conflict may depend on today's program decisions.

### **United States Air Force**

The Air Force's diminishing capability to conduct air base attacks surfaced as early as 1976. Lt Col R. Moody Suter in his paper in the 1976 *Tactical Fighter Symposium Final Report* recognized the effect of airfield hardening and terminal defenses and emphasized the importance of continuing to be able to execute offensive counterair operations.

The offensive CA mission must be preserved at all costs to preserve the USAF, USA, and USN ability to carry out other critical missions. . . . It will be difficult and require conviction but it must be done to allow US forces to win wars where freedom of the skies is contested.<sup>20</sup>

Colonel Suter's plea for the munitions and the concept of operations to carry out the Air Force's proven doctrine is as valid today as when he voiced it at the *Tactical Fighter Symposium* 14 years ago.

According to USAF doctrine air superiority can best be obtained by offensive action. Offensive actions permit the destruction of enemy air forces at their source. Air-to-air combat can maintain air superiority. The lack of proper munitions or concepts to perform the mission does not render the doctrine invalid.<sup>21</sup>

In 1982 a Headquarters USAF study, *Air Force 2000*, advocated the continued necessity for air base attacks and predicted that technology would help redress the increasing chasm between doctrine and capability and thus preserve the ability to conduct offensive counterair missions.

To prevail in theater conflicts, the Air Force must seize the initiative and quickly achieve both air and space superiority. Air superiority will require the capability to effectively attack and neutralize enemy airfields, destroy aircraft before they can employ their weapons, and destroy surface-to-air defenses.<sup>22</sup>

By improving stand-off weapons, all weather systems, specialized munitions and real target location means, technology will magnify the destruction air power can deliver on an enemy force.<sup>23</sup>

In 1983 Col Harold C. Byrd again stated the argument for regaining an effective air base attack capability in his *Air War College research report Offensive Counter Air Operations: An Airfield Attack Perspective*. He insisted that air base attacks were the most important subset of offensive counterair (OCA), and thus the USAF must use advanced technology to stay ahead of enemy defenses.<sup>24</sup>

Similarly, in 1985 Headquarters Tactical Air Command's (TAC) *Project Future Tactical Air Forces 1995-2000* predicted that

manned aircraft, with a variety of munitions operating in conjunction with real time advanced sensors and a command, control and execution system capable of rapid, reliable response will offer the theater commander the most flexible tool to maintain air superiority over friendly territory.<sup>25</sup>

TAC's study did not predict that emerging technology would make it practical to attack sheltered aircraft in 1995, but predicted instead that air

base attacks with standoff weapons would be "tailored to create situations where aircraft can be destroyed in the open."<sup>26</sup> The TAC study forecasted that friendly forces should attack enemy main operating bases between launch and recovery of enemy aircraft by using standoff deliveries of aerial denial weapons. This would force those aircraft to divert to inadequately sheltered alternate bases where standoff area weapons would be used again—this time to destroy the enemy's now vulnerable aircraft on the ground.<sup>27</sup>

The Air Force's vision of the future has remained constant. Manned aircraft are important because of their speed, range, and flexibility. Their capabilities will be complemented in the future by air-, sea-, and ground-launched medium- and long-range cruise missiles; short-range standoff weapons with smart, enhanced effectiveness conventional warheads; and C<sup>3</sup>I networks that include unmanned aerial vehicles (UAV), standoff surveillance and target acquisition systems (SOSTAS), and space-based sensors. The March 1990 *Air Force Policy Letter for Commanders* quoted the remarks of Air Force Secretary Donald B. Rice to a House subcommittee:

Given the unpredictability of the future, our force planning must call for an increased emphasis on force projection capabilities—a shift toward even more flexible, rapidly responding, precise, lethal forces with global reach. The Air Force's focus will be on emphasizing those inherent characteristics of airpower—speed, range, flexibility, precision, and lethality—which best support U.S. national security in the uncertain world of the 1990s and beyond.<sup>28</sup>

Regaining the ability to carry out air base attacks that will secure control of the air by using emerging technology has also been the vision of the Office of the Secretary of Defense (OSD). This vision was expressed in Counterair-90 in 1982 and again in 1987 as part of the new doctrine of Competitive Strategies.

### **Office of the Secretary of Defense**

At a 10 June 1982 summit meeting in Bonn, West Germany, the NATO heads of state and government "agreed that NATO should explore ways to take full advantage both technically and economically of emerging technologies, especially to improve conventional defense."<sup>29</sup> The United States Land Warfare Staff of the under secretary of defense for research and engineering had introduced Counterair-90 to the NATO Air Defense Committee on 2 June 1982.<sup>30</sup> Its presentation was based on

the realization that the offensive counter-air technologies had reached a maturity that would allow them to be used against airfields [and] whether in the form of a surface-to-surface missile (SSM), air-to-surface missiles, aircraft deliverable munitions or a combination of these could be more cost effective than meeting the threat simply with a defensive counter-air posture.<sup>31</sup>

Col James D. Cox, then assigned to the Joint Chiefs of Staff J-5 division responsible for the development of United States military policy on the air defense of NATO, was present at this and subsequent meetings.<sup>32</sup> In his Air War College research report, *Counterair-90: The Airbase Attack Issue*,

Cox reports that the basic premise behind Counterair-90—the requirement for some type of standoff capability for air base attacks—was accepted by both the USAF and NATO military staffs.<sup>33</sup> Amb Robert Komar, the under secretary of defense for policy from 1979 to 1981 and previously the adviser to the secretary of defense for NATO affairs, described the advantages Counterair-90 would give NATO by denying Warsaw Pact air bases, regardless of whether cruise missiles or conventional tactical ballistic missiles (TBM) were used, in “A Credible Conventional Option: Can NATO Afford It?”

An adequate capability to target immediately the 40-odd tactical air main operating bases (MOBs) of the Warsaw Pact in Eastern Europe and keep most of them out of action for even two to three days would greatly ease NATO's large air defense problem. It would also greatly facilitate reinforcement and resupply.<sup>34</sup>

Colonel Cox reports that at this time NATO preferred cruise missiles to TBMs for air base attacks and that the USAF was developing the medium-range air-to-surface missile (MRASM) cruise missile to fill this requirement.<sup>35</sup> However, MRASM was canceled by Congress in November 1983 during the fiscal year 1984 budget submission process.<sup>36</sup> The Air Force thought the missile was too expensive and heavy but was still interested in getting the “right” standoff weapon. As Gen Lawrence Skantze, then the Air Force's acquisition chief, told Congress in March 1983, “If we can get stand-off considerably cheaper, we would like to have that in the inventory.”<sup>37</sup> Similarly, a shorter standoff range weapon designed to complement the MRASM, the standoff attack weapon (SAW) never reached fruition. The SAW was to be “an aircraft-delivered, short range, rocket powered GBU-15 combined effects munition” that would allow an aircraft to release runway cratering munitions 20 miles away from its target.<sup>38</sup>

Three TBMs proposed for air base attack were the conventional attack missile (CAM-40) based on the Pershing missile with a 1,200-pound payload of kinetic energy runway penetrators (KERP), the ballistic offensive suppression system (BOSS) also known as AXE, based on the Trident with a 13,970-pound payload of conventional airfield defeat munitions (CADM), and the total air base attack system (TABAS) with a 25-metric-ton payload.<sup>39</sup> The European Security Study (ESECS) was one of many studies undertaken during 1982 to examine the relative effectiveness of the competing TBMs, cruise missiles, and aircraft with short standoff or direct overflight weapons.<sup>40</sup> The ESECS estimated that 900 conventional TBMs could disable 30 main operating bases for three days for the cost of \$2.3 billion, which covered the 900 missiles along with their basing and 10 years of maintenance.<sup>41</sup>

Colonel Cox reports that throughout this time the Land Warfare Staff of the under secretary of defense for research and engineering adamantly preferred one of the TBMs under consideration, TABAS, over cruise missiles. TABAS was chosen because of its wide area effects in spite of the fact that it would cost more than cruise missiles, would be less cost-effective in destroying aircraft, was easily countered, and had political liabilities.<sup>42</sup>

Ambassador Komer also advocated TBMs because of their prompt reaction time compared to aircraft, but he also acknowledged limitations of TBMs: one-shot capability, permanent basing that denied the flexibility of moving TBMs from theater to theater, and the fact that "there must be no room for Soviet misperception that an early NATO riposte by several hundred missiles might be a nuclear strike."<sup>43</sup> However, in 1985 the proposed TBM solutions to Counterair-90 met the same fate as the Air Force's MRASM and SAW when the

House balked at a potential 10 year ownership cost as high as \$3 billion, a suggested deployment in fixed, hardened silos on European soil, and the fact that other airfield weapons are in development.<sup>44</sup>

Counterair-90 recognized that air base attacks were vital. However, the cruise missiles and short standoff weapons promised by emerging technology never reached completion, and TBMs were both prohibitively expensive and politically infeasible. Since Counterair-90's proposal in 1982, the Intermediate-range Nuclear Force (INF) Treaty, Europe's political restructuring, emergence of a multipolar international environment, and declining defense budgets mandating a smaller, more flexible Air Force combined to eliminate revival of TBMs for air base attack.

However with time, the aircraft, standoff weapons, and C<sup>3</sup>I networks that had long been recognized as necessary for air base attacks seemed finally to be practical—capable, affordable, and reliable—and became vital parts of the Pentagon's new Competitive Strategies doctrine. Like its predecessor, Counterair-90, the new Competitive Strategies doctrine recognizes that airfield denial is central to NATO's counterair strategy and

calls for swarms of NATO interdiction aircraft to attack Warsaw Pact airfields while its fighters are engaging the first waves of the Soviet/Pact offensive air operation, making it impossible for enemy aircraft to land, rearm, refuel—except on less well-defended and less well-stocked secondary airfields.<sup>45</sup>

Thus, this Competitive Strategy is identical to the strategy predicted by the Tactical Air Command in *Project Future Tactical Air Forces 1995–2000*. The common denominator of all three visions of the future is emerging technology. As Benjamin Schemmer reported in the March 1989 edition of *Armed Forces Journal International*:

Foremost among the programs that anchor the Competitive Strategies initiative are highly classified stealth programs like the Air Force's Advanced Tactical Fighter (ATF), the Navy's Advanced Tactical Aircraft (ATA), the Tacit Rainbow cruise missile or remotely piloted vehicle to search out and destroy enemy electronic emitters, advanced conventional cruise missiles, and some smart munitions whose very existence is wrapped in "special access" secrecy.<sup>46</sup>

In February 1986, with the publication of his *Annual Report to the Congress, Fiscal Year 1987*, former Secretary of Defense Caspar Weinberger unveiled the Competitive Strategies doctrine as one of the "four pillars of defense policy" along with arms control, nuclear and conventional deterrence, and the Strategic Defense Initiative. Weinberger announced that Competitive Strategies would be a major theme of the Department of

Defense during the remainder of the Reagan administration.<sup>47</sup> George Pickett provides a clear definition of Weinberger's Competitive Strategies in "The High Stakes Game of Competitive Strategies." These strategies are simply

actions or investments in forces, systems, technologies, doctrine and so forth that exploit U.S. advantages over an opponents' disadvantages to obtain important edges in peacetime deterrence or wartime combat.<sup>48</sup>

The doctrine can be traced back to the earlier theoretical work of Andrew W. Marshall when he was the director for strategic studies at the Rand Corporation in 1968. Marshall's ideas were outlined in the 1972 Rand publication *Long-Term Competition with the Soviets: A Framework for Strategic Analysis* and are discussed in David Abshire and Michael Moodie, "Competitive Strategies."

The concept stressed long-term political, military, and economic competition with both sides in the competition constrained by resource limitations, and in need of a strategy that would provide for adequate forces in a manner more efficiently. Unfortunately, the study had little impact.<sup>49</sup>

In 1985 Weinberger's special consultant on strategy, Graham Allison, brought attention to Marshall's ideas.<sup>50</sup> This attention led to Weinberger's formal announcement of the new doctrine of Competitive Strategy in February 1986 and his memorandum on 7 May 1987 that formed an advisory group—the Competitive Strategies Council.<sup>51</sup> The council was chaired by Weinberger, headed by Deputy Secretary of Defense William Taft IV, and included the Defense Department's highest officials.<sup>52</sup> Along with the Competitive Strategies Council, Weinberger created a steering group, a Competitive Strategies office, and two task forces.<sup>53</sup>

The Department of Defense's self-examination of its basic strategies for deterrence and war fighting were fiscally driven. Gary L. Guertner explains in "Competitive Strategies and Soviet Vulnerabilities" that Weinberger recognized that it was economically impractical for the United States to return to the position of dominance it enjoyed in the 1950s and early 1960s. Weinberger sought to "align enduring US strengths against enduring Soviet weaknesses" by using "strategy more effectively, offsetting deficit-driven budget constraints through the efficient use of resources."<sup>54</sup> Indeed Weinberger stated in his 1987 *Annual Report to the Congress*:

In these circumstances, well-thought-out strategies for competing effectively with the Soviets are no longer something that it would be nice to have; they have become a necessity.<sup>55</sup>

The new Competitive Strategies doctrine was equally welcomed by critics of the Department of Defense. Edward Luttwak, an analyst for the Center for Strategic and International Studies, applauded the Department of Defense's introspective adoption of Competitive Strategies because of his perceptions that

we see the loot shared out according to inherited priorities, with scant regard to all of the vast changes that have so greatly diminished the value of some forces, while increasing the value of others.<sup>56</sup>

We have been doing our own thing and not looking at the enemy. The simple concept of it is that of maneuver [warfare]: Don't hit the enemy where he is strong, but where he is weak.<sup>57</sup>

Guertner predicted that the Competitive Strategies doctrine would be just as relevant to Weinberger's successor, Frank C. Carlucci III, because "he will operate in an even more resource-constrained environment than Weinberger."<sup>58</sup> In fact, Carlucci did hail Competitive Strategies as "a sensible approach to preserving or improving our military capabilities as resources become more scarce"<sup>59</sup> and announced in his *Annual Report to the Congress, Fiscal Year 1989*, that he was pleased to report that considerable progress had been made toward one of our most important goals for 1987 "the process of institutionalizing Competitive Strategies within the department."<sup>60</sup>

The main value of Competitive Strategies is its utility in changing strategic and fiscal environments. For example, with the reduction in nuclear arms mandated by the INF treaty, Competitive Strategies provides a useful tool to ensure a credible deterrence in Europe and elsewhere. I also believe that in the resource constrained environment we face in the years ahead, Competitive Strategies in this and successive administrations will provide the United States the advantage we need in our long-term competition with the Soviet Union.<sup>61</sup>

Carlucci and the chairman of the Joint Chiefs of Staff, Adm William J. Crowe, were strong supporters of the Competitive Strategies initiatives even though they were estimated to cost \$30-to-\$40 billion over six years for munitions and C<sup>3</sup>I.<sup>62</sup> In their joint testimony at the Senate Armed Services Committee hearings in January 1988 on INF Treaty ratification, they said that the Competitive Strategies "doctrine will guide the Defense [Department's] process for acquiring weapons."<sup>63</sup>

Competitive Strategies can facilitate the military's redefinition of its missions and force structure in the new world and domestic environment by giving "the framework for marrying technology to the broader elements of strategy and doctrine."<sup>64</sup>

The goal of competitive strategies is to produce improved military capabilities which are the combination of operational concepts, doctrine, training, procedures, organizations, existing and emerging technologies, and weapon systems.<sup>65</sup>

Competitive Strategies can improve our military capabilities in three ways:

1. By focusing on the doctrine and operational concepts that are needed to tie the ends (objectives) of military operations with the means (military power) to achieve them.
2. By directing research, development, and procurement of those means (superior weapon systems and technologies) that capitalize on our strengths and exploit our enemy's weaknesses.
3. By encouraging alternative organizational approaches to exploit the United States advantages.<sup>66</sup>

All three areas are relevant to the Air Force's ability to control the air. The USAF's doctrine of air base attacks that destroy the enemy's aircraft on the ground continues to be the most effective method of controlling the

air. To our advantage is our technological strength in sensors, miniaturization, intelligence fusion, smart munitions, and microcomputers. To the enemy's disadvantage is the increasing dependence of all current and proposed next-generation fighter aircraft on main operating bases.<sup>67</sup> This dependence on MOBs results in part from requirements to use such difficult to handle substances as liquid oxygen, halon, and hydrazine; reliance on sophisticated ground support equipment for aircraft maintenance and mission planning; and the necessity to maintain large supplies of fuel, weapons, and spare parts.<sup>68</sup> In fact, the continued dependence of USAF's aircraft on MOBs argues strongly for using our advantages to quickly eliminate potential air threats to our own main operating bases. The United States' inherent advantages in these areas must be exploited—and Competitive Strategies can provide the framework for their exploitation—if the US military is to deter aggression or, if necessary, fight and win in the twenty-first century.

These were the recommendations of the first Competitive Strategies task force. It was created in July 1987 to recommend a strategy that could help NATO's conventional defense by examining a "mid-to-high intensity conventional conflict in Europe within a global war context."<sup>69</sup> The task force came to the conclusion that "NATO could deploy forces by the mid-1990s that would be far more capable than they are now of withstanding a Warsaw Pact assault."<sup>70</sup> The task force briefed the Competitive Strategies Council on its recommendations in November 1987. The first of its four recommendations was that "the United States enhance its capabilities to respond to a Warsaw Pact attack by countering Soviet aircraft generation."<sup>71</sup>

This could be accomplished by developing the capability to conduct a phased attack on the Soviet's main operating bases and air infrastructure employing unmanned aircraft, manned aircraft, and long-range, highly accurate conventional missile systems.<sup>72</sup>

The concept was designed to exploit "the Soviet requirement for strict time management and the maintenance of a high-operations tempo" and to capitalize on "NATO advantages in data automation and processing, target acquisition, and intelligence fusion and dissemination."<sup>73</sup> The air base attack campaign conceived by the task force would use:

1. Unmanned systems
  - A. Missiles
    - i. Surface-to-surface
    - ii. Air-to-surface
    - iii. Cruise missiles
  - B. Drones
  - C. Remotely piloted vehicles
2. Area munitions
3. Precision-penetrator warheads
4. Smart submunitions
5. Automatic data processing

6. Intelligence fusion
7. Electronic miniaturization
8. Integrated C<sup>3</sup>I networks
9. Low-observable technologies<sup>74</sup>

Weinberger succinctly <sup>73</sup> scribed the benefits of emerging technology—especially low-observable technology—in executing the air base attack campaign.

If American technology were able to create airplanes, ballistic missiles and cruise missiles essentially invisible to current Soviet radar technology massive Soviet investments in defense against aircraft over the battlefield in Europe would be leapfrogged and rendered ineffective.<sup>75</sup>

Subsequently the "OSD departments, the Joint Staff, the Services, and the CINC's" agreed that the first task force's proposals "in general, were feasible."<sup>76</sup> Finally, the Competitive Strategies Senior Intelligence Committee also reviewed the task force's work.<sup>77</sup> Both groups agreed that the proposals would enhance deterrence.<sup>78</sup> The War Game Committee, composed of representatives from the Joint Staff, the services, and the European Command, completed its six-month study and presented its findings in September 1988. By using a computer simulation of a conventional European war, the War Game Committee members confirmed the first task force's findings.

They indicated that by the combined application of stealth platforms and long-range, highly accurate standoff platforms linked to automated control, NATO could not only sustain robust conventional defense for a month, but leave Warsaw Pact forces in shambles by the end of that period.<sup>79</sup>

In "Revolution in NATO's Conventional Defense Looms from 'Competitive Strategies' Initiative," Benjamin F. Schemmer and John G. Roos list the aircraft, standoff weapons, and C<sup>3</sup>I that are the focus of Competitive Strategies initiatives:

1. Low-observable aircraft
  - A. Advanced Tactical Aircraft (ATA)
  - B. Advanced Tactical Fighter (ATF)
2. Attack and reconnaissance drones
  - A. Seek Spinner
  - B. Tacit Rainbow
3. Mobile conventional missiles
  - A. Multiple Launch Rocket System (MLRS)
  - B. Army Tactical Missile System (ATACMS)
4. Real-time intelligence gathering and fusion systems
  - A. Joint Surveillance and Target Attack Radar System (J-STARS)
  - B. Battlefield Intelligence Collection and Exploitation System (BICES)
  - C. All-Source Analysis Centers
5. Conventionally armed cruise missiles—Tomahawk
6. Standoff weapons with smart munitions
7. Penetrator warheads

8. Fuel-air explosives
9. Scatterable mines<sup>80</sup>

The War Game Committee's computer simulation used NATO's programmed 1994-96 force structure but achieved dramatic results by doubling or tripling the funds for munitions and C<sup>3</sup>I networks possible with technology available in the mid-1990s.<sup>81</sup> The committee assumed procurement in sufficient quantities to be used in "theatre-wide, joint, and combined operations with a carefully time-phased execution."<sup>82</sup>

[The simulation validated] how an integrated, flexible framework can exploit NATO's technological edge to *capitalize* on the close-in battle or forward defense. Follow-on Forces Attack, AirLand Battle, counterair operations, and counter C<sup>3</sup>I—all designed to unhinge a Soviet offensive in Europe [emphasis in original].<sup>83</sup>

This use of emerging technology in aircraft, standoff weapons, and C<sup>3</sup>I networks to gain the ability to carry out air base attacks would have benefits in other unanticipated, and perhaps more likely, conventional warfare scenarios. Consequently, the Competitive Strategies Council appointed a second task force in July 1988 to evaluate US nonnuclear strategic capabilities (NNSC). Specifically the task force examined "operational concepts capitalizing on greatly improved US capabilities in conventional munitions and long-range, highly accurate weapons, and the potential they hold for achieving our strategic goals in various conflict scenarios."<sup>84</sup>

Carlucci's *Annual Report to the Congress, Fiscal Year 1990*, stated that based on the findings of the Senior Intelligence Committee and War Game Committee the first task force's recommendations would be further reviewed by the OSD staff, the Joint Staff, the services, and the war-fighting commanders in chief. These recommendations would then be included in the *Chairman's Military Net Assessment for Strategic Planning* (CMNASP), where they would be evaluated against other strategic and operational alternatives.<sup>85</sup> This is the second phase of the Competitive Strategies evaluation process and the interface with the Joint Strategic Planning System (JSPS).<sup>86</sup> If the first task force's recommendations withstand this scrutiny, the secretary of defense will direct the services in his *Defense Guidance* to develop programs that incorporate the Competitive Strategies initiatives.<sup>87</sup> Secretary Richard B. Cheney's *Annual Report to the Congress, Fiscal Year 1991* does not address these initiatives. However, Cheney's preface to the report does identify advanced technology as one of the 11 broad themes guiding Defense Department planning: "In the coming years, our ability to develop, exploit, and protect advanced technologies is likely to be even more crucial than it has been in the past."<sup>88</sup>

Competitive Strategies has received widespread bipartisan political support. President George Bush endorsed the new doctrine at least four times during his presidential campaign and stated that he would give it a "high priority."<sup>89</sup> "Now we've got a very good concept called competitive strategies. It is going to take us to much better advantage in conventional forces."<sup>90</sup>

The 1986 report of the Democratic Leadership Council, *Defending America: Building a New Foundation for National Strength*, said the United States should look to "devising a military strategy that plays to Western strengths and exploits Soviet weaknesses."<sup>91</sup> Senator Sam Nunn, who provided guidance for the report, told *Armed Forces Journal International* in 1988, that Competitive Strategies "could offer NATO not just greater deterrent strength, but clout at the bargaining table when we move into Conventional Stability Talks next year."<sup>92</sup> However, US national security requirements for emerging weapons should be weighed carefully in arms control negotiations if we are to attain the goal of advancing our strengths against Soviet weaknesses. The Soviets "have been pushing for some sort of ban or limitation on conventionally armed cruise missiles" and in the INF Treaty the United States has already bargained away the capability to deploy conventional ground-launched cruise missiles with a range greater than 500 kilometers (km).<sup>93</sup>

We can expect that the new Competitive Strategies doctrine and the recommendations of the task forces will be closely scrutinized in the coming years of declining defense budgets. As David Abshire, the US ambassador to NATO from 1983 to 1987, states in the *Washington Quarterly*:

The philosophy of the competing strategies approach has not yet been accepted fully by the DOD, and the military services in particular, because, if adopted, competitive strategies would impose tight reins on the planning and acquisition functions that heretofore have been the provinces of the individual and separate services.<sup>94</sup>

Competitive Strategies has raised controversy, including "media reports that the Joint Chiefs of Staff have risen up in revolt against a strategy that would threaten the service's more traditional programs while injecting civilian analysts more deeply into the process of picking and choosing between hardware."<sup>95</sup> This view must be balanced with the remarks of Daniel J. Howard, assistant defense secretary for public affairs, who said Competitive Strategies would add \$30 billion to the defense budget because "some weapons cited as fitting into the new conceptual framework are not fully financed in the new five-year defense plan."<sup>96</sup> Moreover,

It is both wrong and terribly unfair to imply that the Chiefs have blocked something . . . at the same time, there are voices of caution, because this is only one tool as part of our over-all process. And you can't suddenly rip out by the roots a process that has a lot of checks and balances built into it and substitute something else that may not have that.<sup>97</sup>

Dimitri Yazov, the Soviet minister of defense, and Marshal Sergei Akhromeyev, the chief of the Soviet general staff, complained to Secretary Carlucci in 1988 that Competitive Strategies capabilities would provide the United States with an "unfair" advantage over the Soviet Union.<sup>98</sup> This Soviet perception was voiced earlier by Marshal Nikolai V. Ogarkov, then chief of the Soviet general staff, when he said that

rapid changes in the development of conventional means of destruction and the emergence . . . of automated reconnaissance and strike complexes, long-range, high accuracy terminally guided combat systems, unmanned flying machines, and qualita-

tively new electronic control systems make it possible to sharply increase the destructive potential of conventional weapons, bringing them closer to weapons of mass destruction.<sup>99</sup>

In fact in July 1985, Colonel General M. A. Gareyev, at the time a deputy chief of the USSR general staff, said that because

a whole new qualitative leap is imminent . . . especially [in] the appearance of new types of highly accurate conventional weapons in NATO countries the need arises to reinterpret the fundamental military-political and operational-strategic problems of protecting the Socialist fatherland.<sup>100</sup>

### **Independent Studies**

The 1983 European Security Study considered the capabilities NATO required to counter Warsaw Pact air power. It agreed with the proponents of Competitive Strategies on the need for air base attacks and the improved weapon systems to carry them out. The European Security Study concluded that a "large scale and persistent attack on Pact airbases in order to reduce its capability to generate aircraft sorties . . . offers the most effective means of defeating Warsaw Pact airpower."<sup>101</sup> It pointed out, however, that "to defeat or destroy Warsaw Pact air defenses, NATO requires fire-and-forget systems, and better electronic countermeasures."<sup>102</sup>

The European Security Study forecasts that it was possible to acquire and deploy these new technologies to suppress Warsaw Pact air bases by 1986 with "decisive funding and imaginative, stable, and efficient planning and execution of procurement."<sup>103</sup> Instead, by 1986 the Air Force's capability continued to diminish because militarily significant numbers of effective, affordable, and reliable standoff weapons for air base attack were not procured. As Benjamin S. Lambeth, a researcher for the Rand Corporation, stated in his 1986 monograph, *The Outlook for Tactical Airpower in the Decade Ahead*:

A fundamental policy problem in the ground-attack area will continue to be assuring that enough high-quality munitions find their way into the hands of operators. . . . The USAF and the U.S. Navy stand second to none in the development and testing of novel and capable surface-attack weapons. Unfortunately, they have proven less successful in getting many of those weapons funded, produced, and deployed in operationally useful numbers. With some notable exceptions, most of the air-to-ground munitions available to line squadrons are still general-purpose bombs based on technology that dates back to World War II. This unhappy fact is the result of a 30-year American preoccupation with the requirements of nuclear deterrence and, at least until recently, an acquisition approach emphasizing platforms over ordnance.<sup>104</sup>

The Center for Strategic and International Studies in its 1988 report, *NATO: Meeting the Coming Challenge—The Project on a Resources Strategy for the United States and Its Allies*, found that the United States still needed to "give priority to the procurement of critical munitions."<sup>105</sup>

Munitions have tended to receive low priority in procurement budgets. Improved munitions, such as top-attack mines or modular glide bombs, can be a force multiplier, enhancing the effectiveness of existing platforms. Rather than allocating limited

resources for new platforms, munitions improvements should be emphasized in the short term.<sup>106</sup>

Also in 1988, in preparation for the presidential campaign, Democratic party defense experts (Senator Nunn, a member of the Senate Armed Services Committee, and Representative Les Aspin, chairman of the House Armed Services Committee) presented the Democratic Leadership Council's statement on defense policy.<sup>107</sup> The statement echoed the sentiments of the last decade's studies and called for a higher priority on smart standoff weapons.

We have not given enough priority to getting smart standoff weapons into the inventory of the Navy and the Air Force—as the raid on Libya made clear. By relying too heavily on manned aircraft flying directly over their targets instead of highly accurate weapons that can be launched at great distances, we risk the lives of our airmen and limit our targeting options.<sup>108</sup>

## Future Aircraft

Emerging technology promises the command, control, communications, and intelligence networks, the aircraft, and the standoff weapons that will let the Air Force do exactly as predicted in these studies. Aircraft on air base attack missions deep into enemy territory face multiple threats during their ingress to and egress from their targets. Currently, such aircraft as the F-111, F-15E, and F-16 can penetrate to the target area, but their survivability in the target area presents a problem. The combination of small arms, antiaircraft artillery, and surface-to-air missiles threatens unacceptable attrition.

A strike force may expect to encounter heavy attrition in attacking air bases. Past wars indicate an attrition rate of around four percent in tactical support missions where the defense environment is normally of a lower intensity; but attrition rates of four percent over even a few days rapidly become unsupportable.<sup>109</sup>

To survive, the aircraft must attack either in a large task force, which requires a high support-to-attacker ratio, or attack individually under adverse flight conditions—high speed and low level, at night, and either in or under the weather—using surprise to increase the probability of a successful mission.<sup>110</sup> Future aircraft such as the competing designs for the advanced tactical fighter—Lockheed's F-22 and Northrop's F-23—and the A-12 advanced tactical aircraft will use fifth-generation stealth technology to make current integrated air defense systems (IADS) obsolete and to ensure penetration to the target area.<sup>111</sup> However, it must be noted that the current counterair aircraft may have to be prepared to carry the new standoff weapons for the indefinite future because of delays in the production of the A-12/ATA. In a December 1989 memorandum to the deputy secretary of defense, Navy Secretary William Ball III indicated that it might be 20 years before "the A-12 is fully developed and operational."<sup>112</sup> In May 1990 Secretary Cheney announced that along with a reduction in planned

procurement of the Navy A-12 from 858 to 620, Air Force procurement of 400 ATA would be deferred until after 1997.<sup>113</sup>

## **Standoff Weapons**

Once they arrive at the target, current or future aircraft must be able to avoid terminal defenses by launching standoff weapons from outside the lethal radius of the target's terminal or area defenses. Then area or individually guided submunitions can destroy targets as the aircraft egress. Short-range independently guided air-to-surface missiles and medium-range or long-range air-launched conventional cruise missiles—modular standoff weapons—are two examples of the types of weapons made possible by emerging technology.

### **Short-Range Independently Guided Air-to-Surface Missiles**

One example of a short-range independently guided air-to-surface missile now being developed is the low-cost advanced technology missile/expendable intelligent multiple ejector rack (LOCATM/XIMER—pronounced locate 'em/EX-uh-mer). David Fulghum, an *Air Force Times* staff writer, reported that this possible replacement for the current Maverick missile was the result of an intensified Air Force search for more effective air-to-ground weapons.<sup>114</sup> This weapon illustrates the Air Force's goals for new standoff weapons: standoff from terminal defenses, fire-and-forget independent targeting, multiple kills per release, reliability, and affordability.

The Air Force's basic design criteria are based on being able to conduct standoff attacks "in a variety of ways—such as to the side or rear of the aircraft and from a long distance."<sup>115</sup> The missile could have a standoff range of "a few miles at low altitude to somewhat more if it were fired from a high altitude."<sup>116</sup> By designing the missile to avoid only the terminal defenses, the Air Force balances the trade-off between survivability and affordability. Current aircraft in high-threat environments would continue to use tactics and electronic countermeasures (ECM) to penetrate to their release points at low altitudes while low-observable aircraft, which could not be acquired and engaged by medium- and high-altitude defensive systems, could use higher altitudes.

Each missile in the LOCATM/XIMER is designed to be independently targeted without further inputs once it is released from the aircraft. Martin Marietta Missile Systems and McDonnell Douglas Missile Systems have competing concepts for the missile. A Martin Marietta official stated that the weapon's missiles are designed to be "independently aimed to hit a number of targets in a single pass, even at night in bad weather."<sup>117</sup> All such missiles would be independently aimed by millimeter wavelength radar or infrared sensors and be designed so aircrews could

calculate exactly the coordinates of an enemy airfield from satellite information, plug the information into the missiles and launch them miles from the target. . . . The

weapons would be accurate enough to destroy all aircraft on the ramp and in protected shelters, leaving nearby runways intact for possible use by an airlifted assault force.<sup>118</sup>

Because the LOCATM/XIMER six-missile pod is designed with less wind resistance than three 500-pound general-purpose bombs, each delivering aircraft can kill multiple targets.<sup>119</sup> The LOCATM/XIMER could be carried by all current counterair aircraft. The F-16 with two pods could release 12 missiles in a single pass. The F-15E, F-111, B-52, or A-16 could carry more racks of missiles. For example, an A-16 "modified for close air support—is capable of carrying up to four racks with a total of 24 missiles."<sup>120</sup>

The missiles are designed to be reliable and would have a shelf life of 15 to 20 years. The LOCATM/XIMER would come with the missiles loaded in the rack "so that storage and transportation problems, assembly in the field and maintenance would be cut almost to zero."<sup>121</sup>

Finally, the LOCATM/XIMER is designed to be affordable. John P. Kuhns, director of concepts and initiatives in the Air Force System Command division that guides development of air-launched weapons, stated that it is "designed to cost and weigh less, strike harder and be more reliable than the Maverick."<sup>122</sup> The target price for a rack with six missiles is \$200,000.<sup>123</sup> Even if that target price is impossible to meet, as Kuhns suspects, the weapon could be very cost-effective in killing critical aircraft on the ground. For example, if the price increased to \$300,000, a counterair strike by six F-16s each carrying two pods (12 missiles) could possibly destroy 72 sheltered fighter aircraft with as little as \$3.6 million in munitions. If air-to-air combat were necessary to destroy these aircraft, even a 12-to-one exchange rate, which may be overly optimistic against similar aircraft based on historical precedent, would mean the loss of all six F-16s. In addition, the enemy losses could only occur in response to the enemy's initiatives. Finally, the cost would be substantial for sophisticated launch and maneuver, beyond visual range, air-to-air missiles used to gain tactical advantage and achieve desired kill ratios against highly maneuverable adversary aircraft armed with missiles of similar capabilities. For example, the cost of each advanced medium-range air-to-air missile (AMRAAM) launched would be \$700,000, and even the most capable air-to-air missile has a probability of kill (PK) of less than one. (It can kill at best one target and then only if accurately released.)<sup>124</sup> With the LOCATM/XIMER, friendly forces would not have to merely react to enemy initiatives but instead could take offensive action to devastate the enemy's aircraft.

Fulghum quotes an unnamed source as saying that the Air Force requirement for LOCATM/XIMER which could carry submunitions effective against a variety of stationary and mobile targets (aircraft in protective shelters, aircraft in the open, enemy air defenses, buildings, vehicles, and personnel) could exceed 120,000 units.<sup>125</sup> The technology for LOCATM/XIMER was demonstrated in a 1989 test at Eglin AFB, Florida, when

navigation information was passed from a Navstar Global Positioning System satellite through the aircraft to the bomb . . . low-cost inertial guidance systems, controlling

movable fins on the bombs, put more than a dozen of them within lethal distance of their targets.<sup>126</sup>

If the air base attack requirement is validated and the program is given the necessary funding priority in this decade's reduced military budgets, a LOCATM/XIMER demonstration-evaluation program could begin in 1992 with production beginning before 2000.<sup>127</sup>

### Air-Launched Conventional Cruise Missiles

Medium- and long-range air-launched cruise missiles carrying a variety of conventional submunitions—modular standoff weapons—may be required for those critical targets where the delivering aircraft faces terminal defenses with greater lethal ranges or prohibitive area defenses. Counterair aircraft armed with these weapons could obtain the standoff demanded by a specific target's defenses by releasing the appropriate medium- or long-range modular standoff weapon. Conventional submunitions loaded in modular standoff weapons can be target specific and can be capable of multiple kills of a variety of targets including sheltered aircraft. Using modular target-specific missiles allows cost-efficient target destruction since the weapon with greater standoff range, which will inevitably be more expensive, can be reserved for use only when necessary.

Air-launched cruise missiles have several advantages over ground-launched cruise missiles or ballistic missiles. First, the INF Treaty prohibits all nuclear and conventional ground-launched cruise and ballistic missiles with a range of from 500 to 5,500 kilometers (310 to 3,410 miles). Also, even if they were not prohibited by the INF Treaty, ground-launched systems do not have the flexibility inherent in air-delivered munitions and require an expensive, fixed, and possibly politically unacceptable infrastructure tying them to one theater of operations. In the developing international environment, which holds the possibility of conflict in unanticipated regions of the world, the flexibility of air-launched cruise missiles will be a key attribute. As Secretary of the Air Force Donald Rice stated:

The likelihood that the U.S. military will be called upon at some time and place to defend U.S. interests in a lethal environment is high—but now, more than ever, the time and place are difficult to predict.<sup>128</sup>

Some targets—especially those of immediate interest to the Army—could be most effectively attacked with a specialized warhead from either of two Army weapon systems: the multiple launch rocket system (MLRS) with a range of 20 miles or the Army tactical missile system (ATACMS) with a range of 100 miles.<sup>129</sup> Both systems could attack forward fixed-wing and helicopter fields, surface-to-air defenses, early warning (EW) and ground-controlled intercept (GCI) radar sites, and C<sup>3</sup> nodes. This would free the limited attack aircraft to use their speed, range, and flexibility to strike the enemy's centers of gravity not in range of the Army's systems.

As early as 1984, the Defense Advanced Research Projects Agency (DARPA) was "investigating promising technological options for increasing

the range, accuracy, and survivability of future generations of cruise missiles."<sup>130</sup> As the *Annual Report to Congress, Fiscal Year 1984* states:

Guidance and targeting technologies now being developed—self-contained all weather guidance, for example, and a stealthy terrain-following/obstacle-avoidance capability for long ranges—should produce substantial improvements in missile accuracy. The technical capabilities being sought will permit the use of precision non-nuclear munitions against long-range, high-value land and sea targets.<sup>131</sup>

Later, the Standoff Weapons Panel of the Commission on Integrated Long-Term Strategy, in its report on *Extended-Range Smart Conventional Weapon Systems*, stated that indeed

the advent of small, relatively low-cost, high-performance gas turbine and propfan engines, high-energy density fuels, and low-cost, all-weather, day-night, accurate guidance has made this technical choice [cruise missiles] possible.<sup>132</sup>

The Standoff Weapons Panel concluded that cruise missiles designed with low-observable technology would have greatly increased survivability and could be designed to deliver a 400-kilogram (kg) warhead to within a few meters of a fixed target at ranges in excess of 1,000 km.<sup>133</sup>

Technological options are available today that should allow us to develop and manufacture militarily significant quantities of modular standoff weapons. For example, it appears feasible to produce air- and sea-launched weapons for an average unit cost of approximately \$500,000 if properly designed for low-cost, high-production volume, and adequate, rather than superb, technical performance. Thus, 10,000 weapons could be produced for an investment of about \$5 billion.<sup>134</sup>

The panel identified several technical solutions to achieve this accuracy: a minimum capability automatic target recognition (ATR) with low-cost global positioning system/inertial navigation system (GPS/INS), carbon dioxide lasers, and millimeter wave radars.<sup>135</sup> A cruise missile designed with a 500-km range for a 400-kg warhead would weigh approximately 1,000 kg and could be carried by a tactical aircraft.<sup>136</sup> Larger aircraft, such as the B-52, could launch a 1,500-kg cruise missile with a 400-kg warhead at a target 1,400 km away.<sup>137</sup> Either version could be launched from a naval platform.<sup>138</sup> The addition of sea-launched cruise missiles could provide added capability in joint operations when the launching platforms are within range of targeted air bases. The *Annual Report to the Congress, Fiscal Year 1989* reported that by 1992 the United States could deploy nearly 2,000 Tomahawk land attack missiles in some 135 submarines, battleships, cruisers, and destroyers.<sup>139</sup> One example of an air-launched conventional cruise missile that is possible with emerging technology is NATO's modular standoff weapon (MSOW), which was a fiscal year 1986 Nunn Amendment Project.<sup>140</sup> The six countries participating in its development signed a memorandum of understanding on 24 July 1987.<sup>141</sup> This standoff weapon has had difficulty in maintaining support and probably will not be produced. France and Canada discontinued support in 1988 and in September 1989 the United States and the United Kingdom jointly announced they were quitting the project.<sup>142</sup> *Jane's Defence Weekly* reported the Pentagon's explanation for the withdrawal.

The decision to withdraw was based upon budget constraints in both countries and differing national requirements believed to be difficult to reconcile even within a modular programme.<sup>143</sup>

The MSOW was being developed in two variants: MSOW-A, a short-range weapon; and MSOW-B, a long-range weapon. Both versions were expected to be designed with low-observable technology.<sup>144</sup> *Jane's Defence Weekly* quoted sources close to the program as stating that "the US need for a long-range weapon, covered by MSOW-B, is only very slight; the USAF really wanted MSOW-A."<sup>145</sup> The difference between the US and the United Kingdom was that the US wanted a 1,000-kg weapon principally for the F-16 while the United Kingdom wanted a longer standoff 1,600-kg weapon for its Tornado.<sup>146</sup> There is speculation that the United States' withdrawal was prompted by a Northrop "black" weapon similar to the MSOW-B.<sup>147</sup> *Jane's Defence Weekly* reports that a US Navy standoff weapon, the advanced interdiction weapon system (AIWS), is in demonstration/validation and could meet the requirements the USAF sought in the MSOW-A.<sup>148</sup>

One of the submunitions under development for the MSOW is the intelligent shelter attack submunition (ISAS), "a smart kinetic energy penetrator using an infra-red, millimetre-wave or dual-mode seeker."<sup>149</sup> The 14 October 1989 edition of *Jane's Defence Weekly* reported that the United States had withdrawn from the development program for the ISAS in September 1989 when Nunn Amendment "funds needed to launch the program were denied by the US Congress."<sup>150</sup> Apparently, the United States' pullout was prompted by the demise of the MSOW.<sup>151</sup> Full-scale development on ISAS was to have started by 1993.<sup>152</sup>

## **Command, Control, Communications, and Intelligence**

To conduct attacks effectively, the theater commander and assigned aircrews must have near real-time intelligence on the enemy's air order of battle. This capability is being realized because of the merging of reconnaissance, surveillance, and target acquisition (RSTA) information across the depth of the battlefield with the use of advanced sensors and the availability of responsive C<sup>3</sup>I networks. Reconnaissance is the collection of information on a specific area of interest; surveillance is the routine effort to obtain information on the enemy; and target acquisition is the detection, identification, and actual or predicted location of a target with sufficient accuracy to attack it.<sup>153</sup>

The US Congressional Office of Technology Assessment's 1987 report on the technologies required to implement follow-on forces attack (FOFA) identified eight reconnaissance, surveillance, and target acquisition functions needed for FOFA.

1. Detecting, recognizing, and roughly locating targets (surveillance or reconnaissance).
2. Assessing their value and intent (situation assessment).

3. Choosing the targets to be attacked (command decision).
4. Identifying opportunities and means to attack them (targeting).
5. Planning the attack.
6. Tasking attack and reconnaissance platforms to perform the attack.
7. Accurately locating the targets to be attacked (target acquisition).
8. Quickly providing target updates to the attack platforms (attack control). If the attack is to be conducted by aircraft, information on enemy air defenses must also be provided.<sup>154</sup>

The same functions are required for air base attacks. A participant in the 1988 Competitive Strategies European computer simulation said the study:

showed us the extent to which an integrated command, control, communications, and intelligence system will be the essential foundation for theatre-wide targeting. . . . [Competitive Strategies] is a combination of platforms, munitions and C<sup>3</sup>I—but without C<sup>3</sup>I, we're flying blind in the 1990s.<sup>155</sup>

In its 1986 report, *Technologies for NATO's Follow-On Forces Attack Concept*, the Office of Technology Assessment stated that the C<sup>3</sup>I networks to accomplish these eight functions—for FOFA or air base attack (ABA)—were now possible.

Emerging technologies—especially those associated with gathering the information to attack the targets (reconnaissance, surveillance, and data handling), and advanced weapon concepts . . . are now relatively mature, and could result in fielded systems over approximately the next decade.<sup>156</sup>

The heart of the C<sup>3</sup>I networks will be the fusion of intelligence collected “across the full breadth and depth of the enemy's rear area under all weather and lighting conditions.”<sup>157</sup> This fusion will include correlation of communications intelligence (COMINT), electronics intelligence (ELINT), imagery intelligence (IMINT)—including radar, visible, and infrared imagery—and measurement and signature intelligence, such as moving-target indication from radar, to provide continuous RSTA of the enemy's air order of battle.<sup>158</sup> The Joint Tactical Fusion Program is developing the all-source analysis system for the Army and the enemy situation correlation element for the Air Force to provide fusion of all available intelligence sources that will enable striking the deep FOFA targets.<sup>159</sup> In addition, the Weapons Interface Unit, a component of the joint surveillance target attack radar system (J-STARS), is being developed to give en route attack aircraft target data directly from the J-STARS radar.<sup>160</sup> Similar capabilities for intelligence fusion and target data transmission are required for air base attack.

The information required to produce near real-time intelligence for FOFA or ABA will have to come from a synergistic combination of a variety of penetrating unmanned aerial vehicles, standoff surveillance and target acquisition systems, and space-based sensors—just as air base attack campaigns will need to be executed with the correct mix of medium- and long-range ground-, sea-, and air-launched cruise missiles; short-range standoff weapons; and, where possible, direct overflight weapons to balance

the standoff/survivability equation. Gen Michael J. Dugan, the commander in chief, US Forces in Europe, summarized the developing role of the first leg of this duo of sensors and UAVs, in the years 2000 to 2010.

Sensor development, weapons development and delivery technologies will certainly be greatly improved. And it is likely that unmanned systems will begin to intrude heavily in the domain of the pilot. Surely, unmanned reconnaissance systems will have been in the inventory for some time; helping to link the air-ground battlefield to real-time decision making.<sup>161</sup>

The Army's Aquilla remotely piloted vehicle (RPV) is one example of a UAV developed recently. At one time, 376 Aquilla aerial vehicles and 53 ground stations were to be procured, but the Aquilla program had technical and cost difficulties<sup>162</sup> and was terminated when President Ronald Reagan and Congress reached an agreement that required Carlucci to cut \$33 billion from an original \$324 billion request for the fiscal year 1989 defense budget.<sup>163</sup>

Two examples of standoff surveillance and target acquisition systems are the joint surveillance target attack radar system on a military version of the Boeing 707 aircraft and the deployed advanced synthetic aperture radar system-II (ASARS-II) or a follow-on advanced tactical air reconnaissance system (ATARS) on the TR-1. Such systems are vital to FOFA and are designed to locate armor on the modern battlefield.<sup>164</sup> The development of analogous capabilities for the constant surveillance of aircraft movement and positioning on enemy airfields in combination with the current airborne warning and control system (AWACS) capability for monitoring enemy aircraft in flight could give the theater commander a continuous real-time RSTA of the enemy's air order of battle.

The final leg of the triad of sensors important to developing the capability for executing near real-time air base attack campaigns is space-based sensors and the "normalization" of space activities by integrating space systems into the war-fighting theater commander's C<sup>3</sup>I network. Implementation of the Air Force's policy that "space operations can have a decisive influence on future terrestrial conflict" is seen in the Air Force's tactical exploitation of national capabilities program (TENCAP) and the proposed space-based radar (SBR). In 1977 "Congress directed the Air Force to establish the TENCAP program to make better use of existing space systems and influence the design of new systems so they would provide better support to military operations."<sup>165</sup> TENCAP can improve the Air Force's ability to execute air base attack campaigns by improving procedures, tactics, doctrine, and organizational structures that will give tactical commanders the information which is both required and available today; by rapid prototyping of new systems to process, exploit, or disseminate information; and through exercises that test concepts of operations for air base attack campaigns with national systems incorporated into the C<sup>3</sup>I network.<sup>166</sup> The space-based radar could be an important part of the RSTA capabilities of the space leg of battlefield sensors in the twenty-first century. In a December 1988 joint memorandum on Air Force policy, Chief of Staff

Gen Larry D. Welch and Secretary of the Air Force Edward C. Aldridge, Jr., emphasized the Air Force's corporate commitment to "acquire and operate a space-based wide area surveillance, tracking and targeting capability."<sup>167</sup> "Technology is available for a SBR that could provide near-real-time, all-weather, global coverage and be able to detect and track fighter size aircraft."<sup>168</sup>

In conclusion, during the coming decade of international instability and fiscal austerity, the United States must embrace the Competitive Strategies doctrine. The Air Force must hold to its proven doctrine—the first priority of the Air Force is to control the air and this is most effectively accomplished through air base attacks. The Air Force must develop emerging technology into capable, affordable, and reliable aircraft, standoff weapons, and C<sup>3</sup>I networks and be trained to use those capabilities in theater-level air base attack campaigns to destroy the enemy's critical aircraft where they are the most vulnerable—on the ground. Then the USAF that enters the twenty-first century will be able to fulfill the words of the fiscal year 1988 Department of Defense annual report to the Congress.

With our recent progress in new weapons technology, modern sensors, and information processing, our potential to apply smart weapons with precision on an extended battlefield is impressive. The Soviets well understand the combined effect of these doctrines and weapons technologies, as evidenced by the concerned writings of some of their senior officers. Faced with a combination of these new systems and their attendant doctrine, the Soviets will increasingly be forced to doubt the potential effectiveness of their ground combat forces and the efficacy of their doctrine for war in Europe.<sup>169</sup>

#### Notes

1. A. G. B. Vallance, "RAF Airpower Doctrinal Priorities—Past Evolution and Future Trends," *Hawk*, 1989, 42, 44.
2. Malcolm English, "Air Weapons the Equalizers," *Air Pictorial*, October 1980, 388. "Studies have shown that the best way of preventing an enemy from exploiting his air power to an effective degree is by denying him the use of his airfields for extended periods."
3. A unit with 100 aircraft that suffers 4 percent attrition per sortie while flying two sorties per aircraft per day will lose 22 aircraft after three days and 56 aircraft, or over one-half of the force, after only 10 days.
4. Ed Cobleigh, "Look Again at NATO Counter Air Strategy," *Jane's Defence Weekly*, 22 March 1986, 532-35.
5. Congress, Office of Technology Assessment, *Technologies for NATO's Follow-On Forces Attack Concept* (Washington, D.C.: July 1986), 35; see also Benjamin F. Schemmer's "NATO's New Strategy: Defend Forward but Strike Deep," *Armed Forces Journal International*, November 1982, 58. "One USAF study suggested it could take as many as twelve to twenty F-111 overflights using Durandal munitions to knock out a major Warsaw Pact air base."
6. Melissa Healy, "Safety Problems or No, It's Durandal All the Way," *Defense Week*, 9 September 1985, 11; see also Schemmer, 56. French sources state that they use the BAP 100, which is "less efficient" than Durandal, because of aircraft payload restrictions, but that the two munitions are similar because they can each penetrate 8.5-foot-thick concrete slabs.

7. Healy, 11; see also Secretary of Defense Harold Brown, *Department of Defense, Annual Report to the Congress, Fiscal Year 1982* (Washington, D.C.: Department of Defense), 212.

The United States and the United Kingdom have been participating in a joint program to develop a low-altitude airfield attack weapon system (called JP-233). When costs are measured against performance capabilities, no other available alternative has been found to be as cost-effective as JP-233. This is a significant R/S/I cooperative program, not only because of its military potential, but also because it is the only cooperative project in which an allied nation is performing all of the development work. The United Kingdom views U.S. participation in this program as an important demonstration of U.S. commitment to cooperative development programs with Alliance partners. The program was in full-scale engineering development with completion expected on schedule in mid-1984, but unfortunately, the Congress deleted the appropriation for JP-233 from the 1981 DoD budget.

8. Benjamin F. Schemmer, "Stronger Warsaw Pact Runways Cause USAF to 'Cancel' Airfield Denial Weapon," *Armed Forces Journal International*, August 1989, 22. See also page 58 for a discussion of other USAF runway cratering initiatives that did not reach fruition, including Brunswick's low altitude dispenser (LAD) and Northrop's ND-7. The LAD was similar to the German MW-1 but was scaled down so the F-16 could carry two and the F-18 and F-15 four each. It was designed to be launched unpowered six miles from the target or launched with a 400-pound motor attached 12 to 15 miles from the target. A USAF study estimated that three or four LADs released at 50 feet six miles from the target could equal the damage of 12 to 20 F-111 sorties overflying a runway with Durandal.

9. *Ibid.*

10. *Ibid.*

11. *Ibid.*

12. *Ibid.*

13. *Ibid.*

14. *Ibid.*

15. Congress, "Technologies," 34.

The conventional 2,000 lb Mk-84 bomb is capable of penetrating 3.5 feet of concrete if it strikes it perpendicularly; the penetration drops off sharply as the angle of impact decreases, to the point where the bombs may actually bounce off. In addition, penetration of hard targets sometimes damages the fuze of the bomb, which then fails to detonate.

16. *Ibid.* When designing the I-2000 warhead to penetrate hardened targets, the designers replaced the machined and rolled steel case of the Mk-84 with a forged steel case. "Penetration of 6 feet of concrete with a perpendicular impact and 3 feet at a 45-degree angle is expected." The I-2000 can be mated with either a Paveway III LLLGB or a GBU-15. See also "Status of Programs," *Aviation Week and Space Technology*, 19 March 1990, 21.

17. Congress, "Technologies," 34. Greater standoff has been considered, but "development of the AGM-130 rocket-powered version of the GBU-15 was terminated under the amended FY '88-89 budget requests." However, either version, the GBU-15 or the AGM-130, with the current Mk-84 or I-2000 warhead can only kill one target per release and both require a data-link aircraft. James W. Canan, "Comeback of the AGM-130," *Air Force Magazine*, April 1990, 55, discusses the Air Force's current efforts to revive the AGM-130 and reviews the Air Force's current efforts in standoff conventional weapons: a joint Navy/Air Force program to develop an autonomously guided (launch and leave) long range conventional standoff weapon (LRCSW) for the Strategic Air Command and autonomous seekers for the medium-range AGM-130 and short-range GBU-24/B Paveway III LLLGB for the Tactical Air Command. See also "Drop Tests for AGCW," *Jane's Defence Weekly*, 21 April 1990, 726. The USAF will have six test drops in 1990 of the Texas Instruments (TI) autonomous guidance for conventional weapons (AGCW) guidance system. It is designed for day/night/adverse weather standoff autonomous attack. TI claims that the AGCW's

imaging infrared seeker "enables a multi-weapon precision attack with each weapon seeking its own individual sub-target, such as shelters or hangers on an air base." The AGCW could be used on the AGM-130, LRCSW, and advanced interdiction weapon system (AWS).

See also "Status of Programs," 21. The Air Force has signed a contract with Rafael of Israel to procure 86 standoff missiles and four guidance pods for the B-52. In fiscal year 1991 the USAF will receive 26 missiles at a cost of \$25.8 million—one million dollars per missile. This missile will supplement the tactical air force's limited GBU-15 capability in those scenarios where the B-52 can survive the enemy's area defenses but, like the GBU-15, this missile is available in very limited quantities, expensive, and can kill only one target per release.

The Air Force declassification of some aspects of the F-117A program has prompted journal articles suggesting it delivers a single laser-guided bomb. The F-117A's low-observability characteristics could allow delivery profiles that are effective against sheltered aircraft, runways, and air base infrastructure. The F-117A illustrates the need for multiple kill per pass munitions for follow-on low-observable attack aircraft. See "F-117A Carries Single 2,000-lb., Modified Laser-Guided Bomb," *Aviation Week and Space Technology*, 2 April 1990, 21.

See also William B. Scott, "F-15E's Night Attack Capability Assessed in Low-Level Flight," *Aviation Week and Space Technology*, 30 April 1990, 46. John York of McDonnell Douglas defines the same conventional weapon deficiencies for the F-15E. "From 20 nautical miles away, we know exactly where the target is, but still have to fly a lot closer so the weapon can reach it. Once we've designated, we'd like to launch and leave at that point." Scott assesses that "a new family of boosted weapons would take full advantage of the F-15E's systems, while improving aircraft and crew survivability by several factors."

18. Secretary of Defense Caspar W. Weinberger, *Annual Report to the Congress, Fiscal Year 1985* (Washington, D.C.: Department of Defense, 1984), 268.

19. *Air Force Policy Letter for Commanders*, March 1990, 1, 2, 4. The fiscal year 1991 defense budget submitted by the Bush administration was 23.7 percent of the total federal budget and is anticipated to decrease to 21 percent by 1995. This is the "lowest defense percentage of total federal spending since World War II" and compares to 57 percent in the Korean War, 43 percent during the Vietnam era, and 27 percent during the Reagan administration. According to Sean O'Keefe, assistant secretary of defense, comptroller, "the Department of Defense budget will drop by 2.6 percent in fiscal 1991 and will continue dropping 2 percent after inflation each year through fiscal 1995."

20. R. Moody Suter, *Tactical Fighter Symposium Final Report* (U) (n.p.: Tactical Air Command, 1976), 2-182. (SECRET) Information extracted is unclassified.

21. Ibid., 178. (SECRET) Information extracted is unclassified.

22. Headquarters USAF, *Air Force 2000* (U), 1982, 10. (SECRET) Information extracted is unclassified.

23. Ibid., 7. (SECRET) Information extracted is unclassified.

24. Col Harold C. Byrd, *Offensive Counter Air Operations: An Airfield Attack Perspective* (U) (Maxwell AFB, Ala.: Air University Press, 1983), iii. (SECRET) Information extracted is unclassified.

25. Headquarters Tactical Air Command, *Project Future Tactical Air Forces 1995-2000* (U), 1985, 4-17. (SECRET) Information extracted is unclassified.

26. Ibid., 4-16. (SECRET) Information extracted is unclassified.

27. Ibid. (SECRET) Information extracted is unclassified. This study predicted that standoff weapons would be delivered by aircraft. Surface-to-surface missiles (SSM) would not be used because of two disadvantages: high cost and limited flexibility, 4-17. See also James D. Cox, *Counterair-90: The Airbase Attack Issue* (U), Maxwell AFB, Ala., March 1985, 40. (SECRET) Information extracted is unclassified.

28. Quoted in *Air Force Policy Letter for Commanders*, March 1990, 2.

29. Secretary of Defense Caspar W. Weinberger, *Annual Report to the Congress, Fiscal Year 1984* (Washington, D.C.: Department of Defense, 1983), 177.

30. Kurt F. Buckley, "Integrated Air Superiority," *NATO's Sixteen Nations*, May-June 1984, 57.
31. *Ibid.*
32. Cox, v. (SECRET) Information extracted is unclassified.
33. *Ibid.*, 40. (SECRET) Information extracted is unclassified.
34. Robert W. Komer, "A Credible Conventional Option: Can NATO Afford It?" *Strategic Review*, Spring 1984, 47.
35. Cox, 40. (SECRET) Information extracted is unclassified.
36. "Pentagon Strategy to Destroy Soviet Aircraft Where They Sit," *Defense Week*, 12 December 1983, 4.
37. *Ibid.*
38. *Ibid.*
39. N. F. Wikner, "Interdicting Fixed Targets with Conventional Weapons," *Armed Forces Journal International*, March 1983, 86.
40. *Ibid.*
41. Komer, 36.
42. Cox, 40. (SECRET) Information extracted is unclassified.
43. Komer, 38.
44. "Pentagon Strategy to Destroy Soviet Aircraft Where They Sit," 4.
45. Schemmer, "Stronger Warsaw Pact Runways," 22.
46. Benjamin F. Schemmer, "Arms Control Impact and Status of 'Black' Programs Concern Bush Team," *Armed Forces Journal International*, March 1989, 24.
47. Secretary of Defense Caspar W. Weinberger, *Annual Report to the Congress, Fiscal Year 1987* (Washington, D.C.: Department of Defense, 1986), 87.
48. George Pickett, "The High Stakes Game of Competitive Strategies," *Army*, November 1988, 23.
49. David M. Abshire and Michael Moodie, "Competitive Strategies," *Washington Quarterly*, Winter 1990, 30.
50. David C. Morrison, "Rush to Fill a Strategy Vacuum," *National Journal*, 11 July 1987, 1802.
51. Abshire and Moodie, 32.
52. Morrison, 1803.
53. Abshire and Moodie, 32.
54. Gary L. Guertner, "Competitive Strategies and Soviet Vulnerabilities," *Parameters*, March 1988, 26.
55. Weinberger, *Fiscal Year 1987*, 85.
56. Quoted in Morrison, 1802.
57. *Ibid.*, 1803.
58. Guertner, 26.
59. David C. Morrison, "A Pentagon Strategy Draws Flak," *National Journal*, 31 December 1988, 3258.
60. Secretary of Defense Frank C. Carlucci, *Annual Report to the Congress, Fiscal Year 1989* (Washington, D.C.: Department of Defense, 1988), 115.
61. *Ibid.*, 118.
62. Benjamin F. Schemmer and John G. Roos, "Revolution in NATO's Conventional Defense Looms from 'Competitive Strategies' Initiative," *Armed Forces Journal International*, October 1988, 114, 116.
63. Paul Mann, "Competitive Strategies Doctrine Pushed by Defense Department for Post-INF Planning," *Aviation Week and Space Technology*, 1 February 1988, 25.
64. Abshire and Moodie, 33.
65. *Ibid.*
66. See the role of Competitive Strategies as discussed in the *Annual Report to the Congress, Fiscal Year 1988*, page 68; and *Fiscal Year 1989*, page 47.

67. Frank E. Metrusky, *Competitive Strategies and NATO Central Region Air Operations* (Fort Leavenworth, Kans.: School of Advanced Military Studies, United States Army Command and General Staff College, 15 May 1989), 20, 22.
68. Ibid., 21, 22.
69. Carlucci, *Fiscal Year 1989*, 116.
70. Jay P. Kosminsky, "The Competitive Strategies Concept: Giving the U.S. a Battlefield Edge," *Heritage Foundation Backgrounder*, 6 April 1989, 1.
71. Secretary of Defense Frank C. Carlucci, *Annual Report to the Congress, Fiscal Year 1990* (Washington, D.C.: Department of Defense, 1989), 47.
72. Ibid.
73. Carlucci, *Fiscal Year 1989*, 117.
74. Ibid., 117, 118.
75. Morrison, "Rush to Fill a Strategy Vacuum," 1802.
76. Carlucci, *Fiscal Year 1990*, 48.
77. Ibid. The Competitive Strategies Senior Intelligence Committee includes the Defense Intelligence Agency director (chairman), the National Security Agency director, the service intelligence chiefs/directors, the deputy director for intelligence from the Central Intelligence Agency, and the director of the Intelligence Community Staff.
78. Ibid.
79. Ibid.
80. Schemmer and Roos, 114.
81. Ibid., 116.
82. Ibid., 119.
83. Ibid.
84. Carlucci, *Fiscal Year 1989*, 48.
85. Carlucci, *Fiscal Year 1990*, 48.
86. Metrusky, 8.
87. Ibid.
88. Secretary of Defense Richard B. Cheney, *Annual Report to the Congress, Fiscal Year 1991* (Washington, D.C.: Department of Defense, January 1990), preface.
89. Abshire and Moodie, 41.
90. Morrison, "A Pentagon Strategy Draws Flak," 3258; see also Dan C. Quayle, "Upgrading Our Cruise Missiles: Imperative for the 1990s," *Armed Forces Journal International*, August 1987, 76. Senator Quayle highlighted the efforts to develop a zero-CEP cruise missile in 1984 using autonomous terminal homing (ATH)/cruise missile advance guidance (CMAG) a "forward-looking CO<sub>2</sub> laser/imaging infrared seeker that would fit in the nose of the cruise missile. It has a near-zero CEP accuracy and could operate day/night in adverse weather." Quayle stated that "the ATH/CMAG effort had languished in DARPA and DoD labs for over eight years and was about to be terminated for lack of support in 1984." During this time cruise missile technologies was one of the Defense Advanced Research Projects Agency technology opportunities programs. See the identical wording in the Department of Defense, *Annual Reports to Congress, Fiscal Year 1981*, 246; *Fiscal Year 1982*, 248; *Fiscal Year 1983*, III-132.

**Advanced Cruise Missile Technologies:** Engine improvements for greater range and payload, enhanced homing and guidance technologies to improve accuracy, and an improved understanding of detection and tracking phenomena to maintain the ability of cruise missiles to penetrate sophisticated air defenses.

Quayle stated that the military's disinterest in the ATH/CMAG was not unique but that "other cruise missile improvements that would give us a high return on our investment are also being ignored." Quayle listed requirements that are on the Tomahawk long-range master plan: stealth packages, engine upgrades, integrating improved warheads such as hard structure munitions, reloading missiles at sea, higher energy fuels, global positioning satellite (GPS) capability, and shipboard computer improvements. Quayle introduced

"legislation into the 1988/1989 DoD Authorization Bill that would ensure that DoD carries out a program to demonstrate a near-zero CEP seeker for future and existing cruise missiles." Quayle's interest in Competitive Strategies is evident since he based his legislation on Secretary Taft's Competitive Strategies steering group's July 1987 recommendation for a joint Air Force/Navy program for near-zero CEP seeker development.

91. Quoted in Abshire and Moodie, 30.
92. Quoted in Schemmer and Roos, 120.
93. *Ibid.*
94. Abshire and Moodie, 40.
95. Morrison, "A Pentagon Strategy Draws Flak," 3259.
96. *Ibid.*
97. *Ibid.*, 3250.
98. "Soviet Concern about Strategy of Rivalry," *Armed Forces Journal International*, October 1988, 120. Soviet Col V. Alekseyev in a May 1988 article in Moscow's *Krasnaya Zvezda* (Red Star) cited:

"Skeet-type munitions." Tacit Rainbow, MLRS, ATACMS, Tomahawk, TR-1, RC-12K, JSTARS, and JTIDS (Joint Tactical Information Distribution System) as examples of the "fast-action, reliable, high-precision systems of detection, control, communication, and processing of data which ensure the effective application of delivery vehicles and destruction of enemy targets."
99. *Ibid.*
100. *Ibid.*
101. Steering Group of the European Security Study, *Strengthening Conventional Deterrence in Europe: Proposals for the 1980s* (New York: Saint Martin's Press, 1983), 21.
102. *Ibid.*, 22.
103. *Ibid.*, 27.
104. Benjamin S. Lambeth, *The Outlook for Tactical Airpower in the Decade Ahead* (Santa Monica, Calif.: Rand Corp., September 1986), 33.
105. Center for Strategic and International Studies, *NATO: Meeting the Coming Challenge—The Project on a Resources Strategy for the United States and Its Allies* (Washington, D.C.: n.p., November 1988), 53.
106. *Ibid.*
107. "Democrats Propose Defense Policy," *Aviation Week and Space Technology*, 6 October 1986, 70.
108. *Ibid.*; see also "Countdown to Operation EL DORADO CANYON," *Jane's Defence Weekly*, 26 April 1986, 736.
109. Rodney A. Burden, *Falklands: The Air War* (New York: Arms and Armour Press, 1986), 365.
110. Lambeth, 27. "Low altitude penetration promises to remain for some time the preferred tactical option for successfully transiting nonpermissive airspace and attacking heavily defended enemy targets."
111. *Air Force Policy Letter for Commanders*, November 1989, 2. "The ATF is fifth generation stealth. The ATF not only has low observability, good aerodynamic performance, and good engine performance, it also has very high maneuverability at supersonic cruise."
112. Benjamin F. Schemmer, "Arms Control Impact and Status of 'Black' Programs Concern Bush Team," *Jane's Defence Weekly*, March 1989, 24.
113. David Fulghum, "Cheney Offers Big B-2 and C-17A Cuts, ATF Delays," *Air Force Times*, 7 May 1990, 3.
114. David Fulghum, "Researchers Devising More Versatile Missile," *Air Force Times*, 26 February 1990, 24.
115. *Ibid.*
116. *Ibid.*
117. *Ibid.*

118. *Ibid.*
119. *Ibid.*
120. *Ibid.*
121. *Ibid.*
122. *Ibid.* The March 1990 *Air Force Policy Letter for Commanders* announced that Maverick missiles were among the programs deleted from the Air Force fiscal year 1991 budget.
123. Fulghum, "Researchers," 24.
124. "Status of Programs," 21.
125. *Ibid.*
126. *Ibid.*
127. *Ibid.*
128. *Air Force Policy Letter for Commanders*, March 1990, 1.
129. Kosminsky, 1.
130. Weinberger, *Fiscal Year 1984*, 272.
131. *Ibid.*
132. Commission on Integrated Long-Term Strategy, *Extended-Range Smart Conventional Weapon Systems* (Washington, D.C.: n.p., 1988), 19.
133. *Ibid.*, 20, 21.
134. *Ibid.*, 40.
135. *Ibid.*, 21; see also Breck W. Henderson, "New MMIC Chips Could Make Millimeter-Wave Radar Affordable," *Aviation Week and Space Technology*, 26 March 1990, 78. Henderson reports on recent advances in developing monolithic microwave integrated circuits for W-band (75-110 GHz) millimeter-wave radar systems.
136. Commission on Integrated Long-Term Strategy, 19.
137. *Ibid.*
138. *Ibid.*
139. Carlucci, *Fiscal Year 1989*, 195.
140. *Ibid.*, 78.
141. *Ibid.*
142. "US/UK Pullout Sounds Death Knell for MSOW," *Jane's Defence Weekly*, 30 September 1989, 631.
143. *Ibid.*
144. *Ibid.*
145. *Ibid.*
146. *Ibid.*
147. *Ibid.*
148. *Ibid.*; see also "Status of Programs," 21. This inertially guided glide weapon is scheduled to begin full-scale development in mid-1991.
149. *Ibid.*
150. "USA Withdraws from the ISAS Project," *Jane's Defence Weekly*, 14 October 1989, 767.
151. *Ibid.*
152. "Trans-Atlantic Projects Vexed in Recent Years," *Jane's Defence Weekly*, 14 October 1989, 783; see also "USA Withdraws from ISAS," 767.
153. Congress, Office of Technology Assessment, *New Technology for NATO: Implementing Follow-On Forces Attack* (Washington, D.C.: Government Printing Office, 1987), 143.
154. *Ibid.*, 144.
155. Schemmer and Roos, 114.
156. Congress, *New Technology for NATO*, 144.
157. *Ibid.*
158. *Ibid.*
159. James Blackwell, "The Status of Follow-On Forces Attack Technologies," *Military Technology*, October 1988, 122.

160. *Ibid.*, 123.
161. *Air Force Policy Letter for Commanders*, March 1990, 3.
162. Blackwell, 116.
163. *Ibid.*, 125.
164. *Ibid.*, 115; see also Gabriel I. Ferenczy, "Battlefield Surveillance and Target Acquisition," *NATO's Sixteen Nations*, August 1989, 49. Ferenczy reports that SOSTAS synthetic aperture radars can classify a target, for example identify a tank, and locate it within three meters even at a range of 350 kms when orbiting at 40,000 feet.
165. Air Command and Staff College, *Space: The Fourth Arena* (Maxwell AFB, Ala.: Air Command and Staff College, March 1990), 103.
166. *Ibid.*, 104.
167. *Ibid.*, 270. The Joint Chiefs of Staff has approved a multiple command required operational capability for the SBR.
168. *Ibid.*, 86.
169. Secretary of Defense Caspar W. Weinberger, *Annual Report to the Congress, Fiscal Year 1988* (Washington, D.C.: Department of Defense, 1987), 67.

## Chapter 4

# Conclusion

*Deterrence is central to our defense strategy. The key to keeping the peace is convincing our adversaries that the cost of aggression against us or our allies is simply unacceptable.*

—President George Bush  
Address to Joint Session of Congress  
9 February 1989

Emerging technology promises to give US theater commanders the capability to destroy enemy aircraft on the ground. The Air Force's past leaders, current doctrine, and predictive studies are unanimous—destroying enemy aircraft on the ground is the most effective method of achieving the control of the air essential to military victory. This technology must be evaluated now because the nature of tomorrow's Air Force will be decided in the next few years. The Air Force's ability to deter potential enemies and, if necessary, fight and win in the twenty-first century will depend on having both proven doctrine and the ability to carry it out.

The twenty-first century portends a multipolar international environment, worldwide marketing of sophisticated fighter aircraft, and proliferation of chemical, biological, and nuclear weapons. Threats to the United States national interests may come from unanticipated parts of the globe. As part of combined/joint theater commands, the priority mission of the USAF will continue to be control of the air—air supremacy. In every conflict since World War II the USAF has enabled ground, naval, and air forces to accomplish their missions by achieving and maintaining control of the air. Tomorrow's Air Force must be prepared to do so when facing larger numbers of aircraft with similar capabilities. The integrated offensive and defensive counterair campaign advocated by Air Force doctrine—including air base attacks to destroy the enemy's aircraft at his main operating bases and alternate airfields—can quickly provide the control of the air essential to victory.

Tomorrow's Air Force will face increasingly lethal short-range, surface-to-air defensive systems and highly maneuverable, low-observable air-to-air fighters equipped with missiles that give an all aspect, beyond visual range, launch and maneuver, look-down shoot-down capability. The advanced tactical aircraft/A-12 will give the USAF the ability to successfully penetrate on ABA missions in this defensive environment. To avoid lethal terminal threats, the ATA and current fighters such as the F-111, F-15E, F-117, and

F-16 require medium- to long-range conventional cruise missiles and short-range standoff munitions. These munitions must be capable of achieving multiple kills of enemy aircraft (aircraft both in the open and in hardened shelters), denying runway surfaces, and destroying vital parts of a hardened air base's infrastructure. Finally, the fighters and standoff munitions must be mated with near real-time C<sup>3</sup>I networks (including unmanned aerial vehicles, standoff surveillance and target acquisition systems, space-based sensors, and all source intelligence fusion centers). These networks must be able to merge surveillance and reconnaissance so theater commanders can "watch" the enemy's reaction to primary attacks, retarget critical aircraft diverted to vulnerable alternate airfields, and execute attacks to destroy those aircraft before the enemy commander can react.

Until the promises of emerging technology are fulfilled, the Air Force must be prepared to use our current assets in the best manner possible. Penetration of present integrated air defensive systems at low altitude and high speed is still possible by our current fighter aircraft, especially during night and adverse weather with the F-111, F-15E, and F-16C equipped with LANTIRN. However, current munitions are best suited to attacking aircraft in the open and require flying within the lethal envelope of short-range defensive systems. Today's commanders, staffs, and aircrews can execute ABA campaigns by using current C<sup>3</sup>I networks' ability to target critical enemy aircraft that can be successfully attacked with today's aircraft and munitions.

- The Air Force must use available C<sup>3</sup>I networks and the flexibility inherent in current and future fighter aircraft and munitions to complement the current ABA air tasking order cycle. Because we will fight as we train, it is essential that combatant commands practice executing sequential ABA campaigns.

To deter conflict or fight and win, the Air Force must use every capability we have today and use those capabilities emerging technology promises for tomorrow to execute its proven doctrine. First articulated in FM 100-20 in 1943, this doctrine is valid today and for the foreseeable future. **First, obtain and maintain air superiority in the theater.** Then prevent the movement of hostile troops and supplies and participate with the Army to gain objectives on the immediate front of the ground forces.<sup>1</sup>

#### Notes

1. War Department Field Manual (FM) 100-20, *Field Service Regulations, Command and Employment of Airpower*, 21 July 1943, 10-11.